

# The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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**NOTICES:**—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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## Artificial Silk Progress

OF all recent industrial developments, the rise of the artificial silk industry is by far the most romantic. Until the end of the war period only one company produced artificial silk in this country. In the last few years new companies have been coming into existence very rapidly. As a result, artificial silk has been produced at a greater and greater rate. The opinion was expressed, a short time ago, that there was a risk of over-production. Yet the industry continues to grow and flourish, and there are not wanting those who assert that so far the industry has only touched the fringe of its possibilities. At present, the number of companies in this country actually producing artificial silk is twelve, the total production being about 22,000 tons per annum, of which the great bulk is viscose, though large quantities of cellulose acetate silk are, of course, also being produced. The total capital of the industry is about £33,000,000, of which total Courtauld's contribute £20,000,000 and British Celanese £6,000,000. When the output now projected on all hands in this country is realised, it will total forty to fifty thousand tons annually. These figures give an inkling of the scale on which the industry is developing.

In a sense, the artificial silk industry is unique.

However much other industries may now apply scientific methods to the solution of their problems, most of them started by rule-of-thumb. Artificial silk is the child of modern science and technology. Moreover, its growth and development have been along lines of greater and greater complexity, and have been nurtured not only by the skill of the chemist, but also by the remarkable achievements of the textile engineer. For years past, dyestuffs manufacturers have been forced to devote special attention to the dyeing of artificial silk fabrics, and the knowledge and experience thus gained have helped greatly to extend the bounds of our knowledge of dyeing phenomena.

The financial prospects of the industry must be left to the consideration of those best fitted to deal with them. It is, however, clear that on the technical side the possibilities are immense. So far, in spite of the brilliant work of many chemists, our knowledge of the structure of cellulose is still far from complete. The numerous gaps are being slowly but surely filled up, and undoubtedly the growth of knowledge in this direction must have a considerable effect on technical developments. As far as the use of derivatives of cellulose is concerned, it may safely be said that in spite of the great commercial success which has attended their application in various directions, we have barely scratched the surface of the possibilities. Perhaps it is in this direction that the greatest possibilities may be sought.

New successes, however, always bring new difficulties in their train. The question of raw materials naturally comes to mind, and in this connection it may be pointed out that Dr. E. F. Armstrong, at the inaugural luncheon of the Artificial Silk Exhibition, raised the question of future supplies of wood, shortage of which might have serious results for the artificial silk industry. Although cellulose is also obtained from raw cotton, the question of wood supplies is undoubtedly a very serious one. In other connections it has already aroused very heated discussions, and the demands of the artificial silk industry, coming on top of the great and growing demands of the newsprint industry, have rendered the situation more acute than ever. Dr. Armstrong suggested that the artificial silk works of the future might be situated in the country, where it would grow its own raw material for manufacture into fibre. There is a possibility that cellulose materials at present useless may by some means be pressed into service. At the moment this is somewhat remote, but the problem really reduces itself to the separation of cellulose from the useless substances which accompany it, and chemists have solved problems much more difficult than this. Doubtless some bold spirit will venture the suggestion, sooner or later, that chemists may produce a genuine synthetic material for conversion into fibre; but for a good many years

to come this notion is likely to remain the monopoly of the romantic novelists.

The members of the chemical profession will regard the industry with an eye of affection, for not only is it the offspring of their own science, but in the nature of things it will employ more and more scientifically-trained men as its already involved processes grow more and more complex. To the nation at large the industry is a sign and a portent of the value of applied science, in that it has grown and flourished enormously at a time when other industries, of much longer establishment, have been struggling to preserve their existence.

### The Chemical Export Market

FROM the Board of Trade returns, and from other somewhat less formal signs and portents, it is clear that the chemical industry of this country is in an increasingly prosperous condition. It is worth while looking into details of recent exports, in order to note trade items that promise to expand. To begin with ammonium sulphate, the quantity exported during February amounted to 26,199 tons, as compared with 11,053 tons a year ago. The Dutch East Indies, Japan, and other countries all took largely increased quantities, and in view of the fact that not only abroad, but in this country also, there is still room for increased application of fertilisers, the outlook for the ammonium sulphate trade is bright. In view of the apparent end of the negotiations between British and German chemical interests, hints have solemnly been dropped in the daily Press of possibilities of cut-throat competition in fertilisers; but against this there may be set the decisive fact that very shortly another international conference of producers of synthetic nitrogenous fertilisers will be held.

Dyes and dyestuffs form another point of interest in the export market, as the figures for February show a considerable advance on last year (£68,998 as compared with £47,463). Painters' colours and materials, always a bright spot, maintain their exports (£308,516 as against £306,236). Moreover, it may be expected that when the Research Association of the British Paint and Varnish Manufacturers gets into its stride, British paints and allied products, excellent as they already are, will reach a yet higher standard. The paint manufacturers are pursuing a very wise policy. Instead of waiting for a period of depression before looking to their laurels, they are actually thinking of better things even at a time of prosperity: they deserve to reap a rich reward.

In one or two directions, setbacks must be recorded. Exports of drugs and medicines show a fall (£233,714 as compared with £251,881); while a slight decrease in exports of sodium compounds is also recorded (£302,354 as against £335,628), due mainly to decreased exports of sodium carbonate and caustic soda. As chemical exports as a whole increased in February by £301,543 as compared with last year, these small details need not deter us. In the chemical industry the barometer of trade for the year 1928 seems set fair.

A point of some interest in connection with chemical exports is the question of overseas selling organisations. It has been reported in the Press in the last few days

that Imperial Chemical Industries are paying special attention to South American markets, and that "plans are proceeding for the formation of a number of subsidiary companies of Imperial Chemical Industries to organise a big marketing scheme throughout South America." It is probable that the actual facts on which these statements are based is simply the reorganisation and unification which is being effected in all departments of the companies who were merged in I.C.I. Presumably, the marketing of products in such a place as South America will in future be under unified direction, instead of (as was the case before the merger) being carried on separately by each member of the group. This should have immediate and important results. The South American republics form a rich field for trade. Since the war, Great Britain's share in this trade has not been entirely satisfactory. The reports of the Department of Overseas Trade have indicated the reason for this. British goods have maintained a high standard of quality, but British firms have not always paid sufficient attention to the needs of their overseas customers. In view of the marketing methods adopted by I.C.I., it is certain that, as far as they are concerned, this complaint will not apply.

The South American market is of special interest at the moment, in view of the participation of Chilean representatives in the forthcoming conference of producers of nitrogenous fertilisers. The nitrate market is still in a doubtful condition. Latterly, dark hints have been dropped as to possibilities of a recovery, but the position is still obscure. It is, however, not unlikely that 1928 will not fall behind the past few years in signalling important events in the development of chemical fertilisers.

### Books Received

- FUNDAMENTALS OF DAIRY SCIENCE. By Associates of Lore A. Rogers. New York: Chemical Catalog Co., Inc. Pp. 543. \$5.50.  
THE MINERAL INDUSTRY OF THE BRITISH EMPIRE AND FOREIGN COUNTRIES. IODINE. By the Imperial Institute. London: H.M. Stationery Office. Pp. 21. 6d.  
ORGANIC CHEMISTRY. In Three Parts. By J. B. Cohen. London: Edward Arnold. Pp. 450. (Each) 18s. per volume.

### The Calendar

Mar.		
27	Institution of Petroleum Technologists: Annual Meeting. 5.30 p.m.	Royal Society of Arts House, London.
27	Society of Chemical Industry (Yorkshire Section): A discussion on Some Aspects of the Oil Cake and Feeding Stuffs Industry. 6.45 p.m.	Grey Street, Park Street, Hull.
28	Society of Chemical Industry (Newcastle-on-Tyne Section): General Meeting. "Emulsions, Their Scope and Application." W. E. Billingham. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
29	Chemical Society. 8 p.m.	Burlington House, London.
29	Society of Dyers and Colourists (Midlands Section): "Azoic Colours." Professor F. M. Rowe. 7.30 p.m.	University College, Nottingham.
30	West Cumberland Society of Chemists and Engineers: Annual Meeting. 7 p.m.	Workington.
30	Institute of Metals (Sheffield Section): "Non-Ferrous Metals in relation to Ferrous Metallurgy." W. H. Hatfield. 7.30 p.m.	University, Sheffield.
Apr.	Institution of the Rubber Industry.	Engineers' Club, Coventry Street, W.
2		

## A Chemist's Jottings on Holiday

THE centres of chemical industry in this country (a chemical tourist writes) have little to offer in the way of holiday attractions, but one or two beauty spots have become interesting to chemists through the growth of the aluminium industry.



NEAR FOYERS, LOCH NESS.

Steaming down Loch Ness, for example, one is surprised to come across a busy little place apparently cut off from the outside world. This is Foyers, at one time famous for its waterfalls, but the water is now used for making electricity and nothing is to be seen, at least from the lake steamer, except the buildings in which aluminium is being manufactured. Time spent at Fort William will not be lost, for there has been much work done in the neighbourhood making use of the water that comes down the valleys. On the sombre-looking valley of Glencoe and Loch Leven, also, the aluminium industry has left its mark, for not far away is Kinlochleven, the scene of Patrick MacGill's "The Red Horizon"—a tale telling in vigorous English about the making of the great reservoirs in the hills for the generation of water power.

On a Continental holiday the old town of Bordeaux is worthy



FALLS OF THE RHINE.

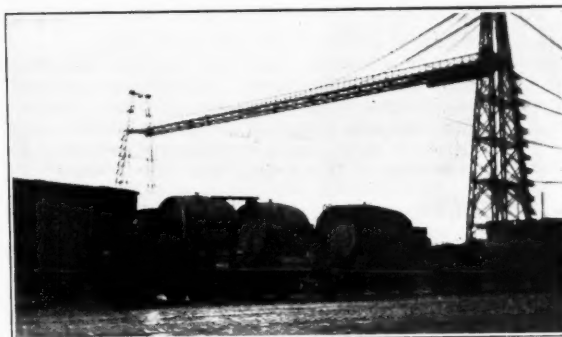
of a stay, since it is the centre of a great wine industry and also an important port. The railway from Bordeaux to Bayonne is now electrified, and passes through the Landes district. At one time this region was very marshy and frequented by shepherds who were compelled to walk on stilts, but the marshes have now been drained and countless pine trees planted. These trees not only prevent the sand from blowing inland from the Bay of Biscay, but are also used to supply resin for an extensive turpentine industry. Most of the trees have been gashed, V-shape, and the resin slowly drains into large earthenware vessels. The collection of the resin is done systematically and taken to the stills where the turpentine is obtained. Complete purification is not carried out, however, the crude product being sent away for further treatment.

A short stay at Bayonne is worth while before proceeding to the more fashionable Biarritz. There is a large borax refinery on the banks of the Adour, where the crude material, probably ulexite, sent over from the States, is being converted into borax. The treatment consists of boiling with soda ash and bicarbonate of soda, whereby the calcium of the ore is

precipitated as carbonate, and borax remains in solution and is afterwards crystallised.

In going from Biarritz to the Mediterranean, the sea is first seen a few miles beyond Beziers, where the railway passes along a narrow strip of land between the sea and the salt lagoon known as the Étang de Thau. A few salt pans are to be seen, very much like our sewage farms except that the plots are much larger. At this time of year they will be full of water, but piles of crude salt are usually to be seen, often partly covered with tarpaulin or corrugated iron. Later in the year, August or September, these pans are dazzling white with crude salt which is scraped together and left exposed to the air, so that the deliquescent magnesium salts may drain away. Before reaching Montpellier many more of these evaporation basins are seen, and if the weather is hot, as in early April last year, a white fringe may already be seen round the edges. The large Étang de Berre is also a very important centre for this method of making salt.

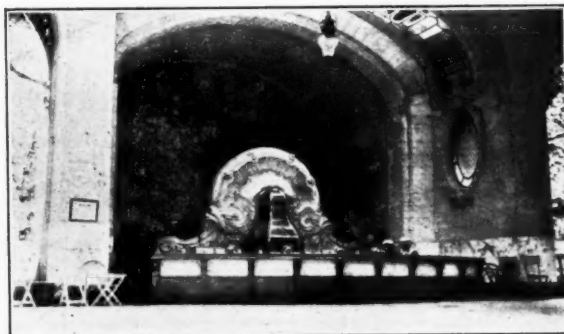
Montpellier makes about 4,000 tons of cream of tartar per year from wine residues. This accounts for the enormous number of large wine vats always to be seen in the railway sidings. If the market prospects are good, these are scraped



WINE BARRELS AND TRANSPORTER BRIDGE AT ROUEN.

out and the residues treated with lime, which fixes nearly all the tartaric acid. Excess of lime would bring down iron and perhaps other metallic hydroxides, and so make the purification of the resulting tartrates much more difficult. One of the factories is near the station used by trains to Palavas, and from April onwards is often very busy, since "returned empties" are numerous. Most of the argol is obtained from the cheapest wines, since the higher the alcohol content of a wine, the less is the tendency to produce argol. Thus, the common "vin rouge" yields much tartaric acid and its argol also contains iron.

Vichy is not so prettily situated as Royat, but is much larger. The various springs or "sources" are in specially built halls, and the waters are free. Some of them are quite hot as they



SOURCE CELESTINS, VICHY.

issue from the ground, and they are not unpleasant to the taste. Near the station is a large bottling factory, and there is a factory near the Main Hall, where the waters are evaporated under reduced pressure for the recovery of the constituent salts. These are in great demand, especially in France, and



contain potassium bicarbonate to some extent. Most of the springs are State property, and one of them, Source des Celestins, has an output of about 45,000 gallons per day. Near Vichy there are intermittent springs, as at Bellerive, only a mile away, where the flow is every six hours, while at Hauterive, four miles away, there is a spring whose temperature is 142° F.

While at Nice the chemical traveller should visit the natural perfume factories at Grasse. He will also be able to see the cork and olive oil industry between Avignon and Nice, and probably something of the sea salt industry on the Étang du Berre when nearing Marseilles. At Grenoble, electricity made by using "white coal" is largely used.

From Zurich the Falls of the Rhine are easily reached by booking to Neuhausen. The aluminium works take a good deal of the water, but there is still enough, in early summer at any rate, to make the sight one worth going to see.

Mulhouse is in the very centre of the Alsace potash industry, and such efforts are being made by the Alsace Potash Syndicate to advertise their products that no difficulty should be experienced in gaining permission to visit one or other of the "concessions."

### Registration: An Analysis of Opinion

To the Editor of THE CHEMICAL AGE.

SIR.—Since the publication of the report of the Association's Special Committee on Registration, we have been engaged in the task of collecting, largely from non-members, information regarding the opinions held concerning the whole question.

The information is, of course, by no means complete, but a provisional analysis at this stage proves to be of considerable interest. The opinions fall roughly into five classes—(1) Those definitely in favour, (2) those definitely against, (3) those indifferent, (4) those who hold the view that registration is impossible at present, (5) those who consider that it is not possible at all.

Class 1 probably does not exceed 20 per cent., but against this has to be set the fact that their support of the principle arises from a careful consideration of all its implications. It is a definite policy and one, therefore, carrying considerable weight, and remarkable agreement as to the essentials of the policy exists.

The case of Class 2, greater numerically, it would seem, than is generally supposed (10–15 per cent.), is much more complicated. Putting aside examples of mere prejudice, varied opinions exist. First in importance is, perhaps, the view that the policy of registration is an astute mark for a rapacious economic policy; or again, the view that the General Chemical Council would outdo in its pretensions and tyranny the General Medical Council, although the directions in which the General Medical Council has proved itself pretentious or tyrannical remain unspecified. It is, indeed, very difficult to take seriously this astounding contention. In a third direction the interesting fact has emerged that a not negligible proportion of those practising belong to no society at all. These view with suspicion—at least as far as administrative matters go—the activities of them all. They consider either that all organisation is a mistake—the view, in fact, that the profession of chemistry does not really exist—or that the society is yet to be formed which can command the allegiance of all chemists.

Nothing is to be gained by a discussion of Class 3 (about 40 per cent.). It might be described as approximating to that body, yet to be discovered, which possesses no inertia; but one nevertheless that will be drawn along with that opinion which ultimately attains the greatest momentum.

Class 4 (15 per cent.), whose case is frequently closely argued, presents considerable difficulty, since its view is that evolution without conscious effort will gradually improve professional organisation.

The remaining 10 per cent. in Class 5 are also capable of supporting their position with strong arguments. In general, they hold that the profession of chemistry differs in such fundamental particulars from those already closed that all attempts more fully to organise it must prove abortive.

To discuss these varied opinions in detail would occupy too much space, but it has, I think, been clearly shown that the Association is not blind to the problems registration involves. On the other hand, there is good hope for the future, since it may fairly be argued that ten years ago nothing like

20 per cent. of the profession ever gave the matter of registration a thought.

The Association may therefore justly claim that it has awakened interest in a large proportion of this 20 per cent., and believes that almost daily an increase in interest takes place.

And finally, if chemists will forgive thus being pigeon-holed, or consider that the pigeon-holing is inaccurate, they are invited to communicate with us direct or through the correspondence columns.—I am, etc.,

HENRY T. F. RHODES,  
British Association of Chemists, General Secretary,  
"Empire House,"  
175, Piccadilly, London, W.1.

### The Sir Jesse Boot Lecture

Dr. F. L. Pyman on "Drugs"

THE sixth Boot Lecture was delivered by Dr. F. L. Pyman, F.R.S., at University College, Nottingham, on Friday, March 16. Professor F. S. Kipping, F.R.S., who was in the chair, referred to the munificent benefactions of Sir Jesse Boot to the city and the College. The evidences of this were already conspicuous at Highfield, the latest being the Great Hall and the Women's Hostel.

The lecturer, in commencing his address, referred to the suitability of his subject "Drugs" as a lecture in honour of Sir Jesse Boot's foundation of the Chair of Chemistry. He proceeded to describe the preparation of drugs from the earliest times as stages in the evolution of chemical industry. In the empirical period, up to the end of the eighteenth century, crude natural products, largely inorganic, were used. In the nineteenth century began the isolation of organic chemical compounds from drugs, and later on the biochemical period was marked by the development of chemotherapy at the hands of Pasteur and Ehrlich, and the preparation of hormones from the endocrine glands.

#### The First Studies of Drugs

In the classical period, Galen, the last representative of the Alexandrian school, made many preparations of vegetable drugs, which were still called "galenicals." Another doctor, Dioscorides, used a certain number of clays, which were known as "terra sigillata," because they were sealed with their place of origin, and these were probably the first recorded trade marks. Geber, in the ninth and tenth centuries, mixed his chemical and medical recipes so much with astrology that his unintelligible writings originated the word "gibberish." The use of metallic salts was associated with Basil Valentine, the author of "The Triumphal Chariot of Antimony," and Paracelsus in the fifteenth century definitely stated the object of chemistry as being the preparation of medicine and the search for gold. Boyle introduced a new point of view in claiming chemistry as a fit study for the philosopher rather than the doctor. In the seventeenth century valuable drugs, such as the cinchona alkaloids and ipecacuanha, were introduced from South America.

#### Advances in the Last Hundred Years

In the nineteenth century active principles were extracted from drugs, as for example morphine from opium in 1816. (The proportion of these was illustrated by specimens shown by the lecturer, such as two ounces of ipecacuanha root, and the proportional amount of extract and of emetine hydrochloride.) The chemical structure of these principles was then unknown, and attempts to synthesise them (*e.g.*, quinine) led to the discovery of synthetic drugs, *e.g.*, antipyrin. Such drugs as phenacetin and aspirin were at first used to combat symptoms. The study of the selective staining of such micro-organisms as those of anthrax by dyes led to the preparation of specific trypanosome poisons *e.g.*, salvarsan.

The history of vitamins was then briefly outlined, and also that of hormones such as adrenalin and insulin. The purification of the latter by precipitation at its isoelectric point with alkali, and by picric acid, was illustrated by experiments. The discovery by Minott and Murphy in 1926 that pernicious anaemia was benefited by eating  $\frac{1}{2}$  lb. of nearly raw liver per day was followed by the extraction of a concentrate, which was small in amount and palatable.

The lecture was freely illustrated by lantern slides of alchemists and their laboratories, modern plant, and specimens and experiments.



## New Synthetic Methods in Oil and Fat Chemistry

(From a Correspondent)

*Recent research on the synthesis of oil and fat products is of importance in a number of ways. From the purely scientific standpoint it helps to cast light on a part of chemistry which still shows many puzzling problems, while it is certain to have industrial results of great interest.*

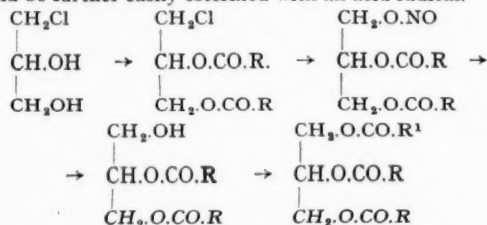
THE work of Chevreul and others in elucidating the exact composition of fats and fatty acids led to the gradual evolution of synthetic methods in the chemistry of oils and fats. Three different kinds of syntheses may be described: (1) The synthesis of fatty acids and of glycerin; (2) The reconstruction of fats from their split constituents, fatty acids and glycerin; and (3) The synthesis of new products, using natural fats as starting point.

As regards the first group, this is to-day of only theoretical interest, since the building up of fatty acids by methods at present available is much too complicated; although, during the war, considerable importance was attached to the production of fatty acids from paraffin hydrocarbons by chlorination and the Grignard reaction, or alternatively by breaking down by oxidation the carbon chain of a high molecular-weight paraffin hydrocarbon, thus obtaining acids with a lower number of carbon atoms. The same applies to the production of glycerin, *e.g.*, the so-called Protol, obtained by biological methods.

### Synthesis of Glycerides from Their Constituents

The second group is more practicable, and there are several methods for the formation of glycerides from fatty acids and glycerin. Taking the glycerin formula as propantriol-1 : 2 : 3, there are several different esters of glycerin possible, and one may use one, two, or all three hydroxyl groups, thus obtaining mono-, di-, or tri-glycerides. Moreover, in the case of the mono-glyceride two isomers are possible, and with the di- and tri-glycerides several isomers may be formed, and thus we have mono-acid or di-acid diglycerides, and mono-, di-, or tri-acid triglycerides and their optical isomers. In the case of natural oils and fats no example of optical isomerism has so far been discovered with certainty; on the other hand the work of Grün, Bömer and others has shown that the polyacid or mixed acid glycerides in natural fats are by no means rare, rather the contrary.

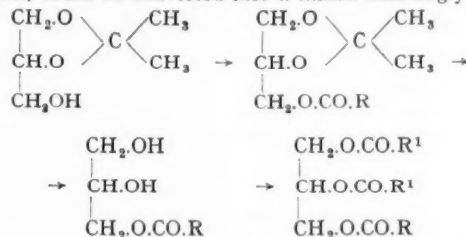
The synthesis of mono-acid triglycerides offers no particular difficulty, as the general methods for their preparation have been fully worked out, including the use of suitable metallic catalysts, both in the production of glycerides from fatty acids, or mixtures thereof with neutral fat. For the synthesis of mixed acid triglycerides new and special methods are needed, such as those of Grün, in which, starting from the different chlorhydrins of glycerin, the hydroxyl groups were esterified with the chloride of a fatty acid; but there still remained the problem of introducing some fatty acid radical instead of the chlorine atom. This was achieved by reaction between the acylated chlorhydrin and the silver salt of another fatty acid, although, since this was only possible at fairly high temperatures, there was risk of displacement of the acyl group from the alpha to the beta position, or vice versa. Grün accordingly converted the  $\alpha$ -chlorhydrin together with an acyl group into the diacyl ester of the chlorhydrin, and then replaced the chlorine, by treatment with silver nitrite, by the nitrous radical, which could then be easily hydrolysed without hydrolysis of the other ester groups occurring. In this way it was possible to obtain the  $\alpha$ ,  $\beta$ -diglyceride, which could be further easily esterified with an acid radical.



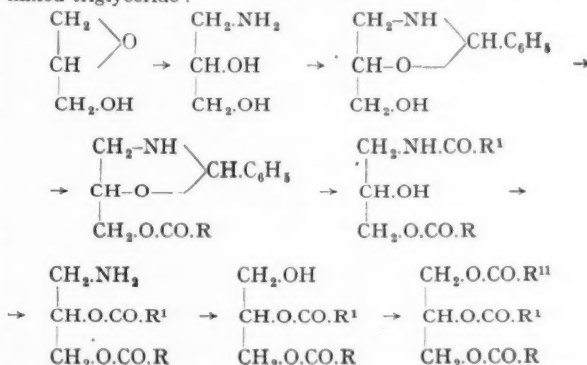
### Emil Fischer's Method

Emil Fischer used another method. He started with acetone-glycerin and esterified the hydroxyl groups therein with a fatty acid. By careful saponification the acetone base

could be again split off without the ester group being hydrolysed, thus forming the  $\alpha$ -monoglyceride, which, by the usual methods, could be converted into a mixed acid triglyceride:



Bergmann has suggested a third method for synthesising mixed glycerides, using as a starting-point the alcoholic glycidic or epihydrin alcohol, which is converted into the amino-propylene glycol. With benzaldehyde, this forms the 2-phenyl-5-methyl-isoxazolidin, to which an acyl group may be added, the benzaldehyde split off with hydrochloric acid, the *O*-N diacyl derivative of the amino-propylene glycol being formed. By treatment with phosphorus pentachloride and hydrochloric acid the acyl group is transferred from the nitrogen to the oxygen, thus forming the chlorhydrate of the *O*-diacyl-aminopropane, which may be converted into the  $\alpha$ ,  $\beta$ -diacyl-glycerin with nitrous acid, and finally into the mixed triglyceride:



From the foregoing it will be seen that special synthetic methods are available for the production of both mono-acid and poly-acid triglycerides, with mono- or di-glycerides as intermediates. In this way, therefore, we can obtain, for example, an oleodipalmito glycerin with the oleic group either in the  $\alpha$  or  $\beta$  position, although, from the practical point of view, this particular synthesis is too complicated to be of much commercial use at present. But other reactions are also at hand which, however, belong rather to the third group of syntheses, and are therefore based on such chemical changes in natural oils and fats as bring about the results desired, constituting what may be described as ennobling or perfecting processes. We come, then, to that third group.

### Synthesis of New Products from Natural Fats

It must be pointed out in the first place that the most important of such processes is that of fat-hardening or hydrogenation, as first worked out by Normann, for the conversion of liquid fatty acids and their glycerides by catalytic hydrogenation into solid fatty acids or their glycerides, so that from the cheaper liquid oils valuable hard fats may be obtained. There is no need further to describe this important achievement here: both its technical and economic implications are by now well understood.

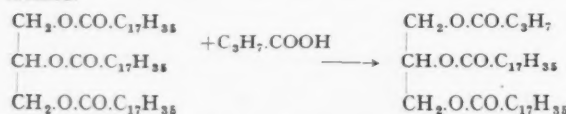
Another process of this class is based on the well-known fact that triacetin, or glycerin acetic ester, by simple heating with glycerin yields mono- and di-acetin, an acetic radical being transferred from the triacetin to the glycerin. Berthelot had

already discovered that the monoglyceride in particular reacts with ethyl alcohol, forming glycerin and the corresponding ethyl ester of the fatty acid. Later a somewhat similar exchange between alcohol and glycerin was observed with triglycerides in the presence either of hydrochloric acid, as observed by Rochleder in 1846, or with alkali, as shown by Duffy in 1852. Such reactions may be looked upon as alcohol radical interchanges (alcoholysis). We can, therefore, from glycerides which cannot be distilled even in high vacuum, obtain the ethyl esters, which may be easily distilled under these conditions. These methods may be advantageously used in the laboratory if it is desired to investigate the fatty acids of a natural oil or fat, esterifying with methyl alcoholic hydrochloric acid and distilling in vacuo the fatty acid methyl esters so formed.

The fatty acid alkyl esters have hitherto found little practical application. During the war attempts were made to use them as edible fats; also, according to Grün, they are useful in the treatment of leather, and in some respects are superior to ordinary glycerides. Generally, however, their range of usefulness is limited.

#### Ester Reactions of Practical Interest

On the other hand there are some ester reactions which are of considerable practical interest. There are several glycerides of comparatively high melting point, such as tallows and hardened oils, containing large proportions of tristearin, palmitodistearin, and also in hardened fish oils, behenic acid glycerides. But owing to their high melting point they are not suitable for edible purposes, as they are not easily assimilated. They may, however, be converted into lower melting point fats if the high molecular-weight fatty acids in the glyceride are replaced by those of lower melting point, or by transforming into mono- and di-glycerides. By the use of suitable metallic catalysts, as indicated by Normann, the mono- and di-glycerides so obtained may be esterified by other lower molecular fatty acids, yielding mixed glycerides with melting points within the desired limits. Normann has also described another method consisting in an acid radical interchange in the glyceride. If, for example, tristearin is heated with butyric acid, butyro-distearin and free stearic acid are obtained, and on removing this latter by saponifying with alkali a neutral and lower melting point glyceride is produced; or the free stearic acid may, with glycerin, be esterified in the known manner into a mono- or di-glyceride, and in this way, too, neutral glycerides may be formed.

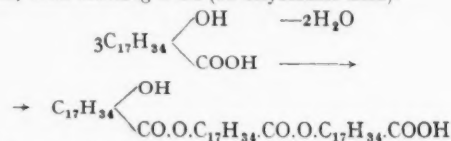


It is, indeed, possible thus to synthesise glycerides which are not found in natural fats. Just recently, acids with an odd number of carbon atoms have been used in glyceride formation in order to obtain fats of special physiological value, such as "Intarvin" for diabetes. An outstanding example of these improvement processes is castor oil. Castor oil is a glyceride of ricinoleic acid, an unsaturated oxyacid occupying a rather exceptional position among the natural fats in view of its consistency, its viscosity, and its easy solubility in absolute alcohol. It is also well known that by the action of sulphuric acid on this acid we may obtain sulphonated products which, owing to their solubility and emulsibility in water, are very valuable in the arts and manufactures as Turkey red oils.

#### Formation of Estolides

Detailed investigation of the action of sulphuric acid on ricinoleic acid has shown that beside sulphonation there is condensation of the ricinoleic acid, since the COOH group of the one molecule is esterified with an OH group of the other molecule. These esters are called estolides, and if they are further esterified with glycerin then poly (oxy fatty acid) glycerides are obtained, having valuable technical properties, especially as lubricants, and in the treatment of textiles, leather, etc., to make them soft and flexible. Grün has thus prepared a poly (12-oxystearic acid) glyceride. The triglyceride of 12-oxystearic acid may easily be obtained by hydrogenating castor oil, and if this glyceride is now split

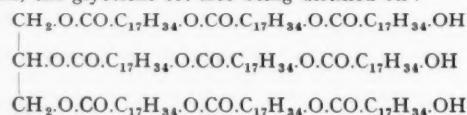
under suitable conditions we obtain not the free 12-oxystearic acid, but an estolide, in the composition of which three molecules of the oxyacid take part, two molecules of water being split off, thus forming a tri-(12-oxystearic acid).



But the reaction is not definite and complete: in fact, a mixture of different estolides is obtained, consisting of 3, 4, 6, and 8 oxystearic acid molecules. These estolides may be again esterified with glycerin, forming glycerides, and compounds of exceptionally high molecular weight are thus produced, e.g., triglycerides of estolides in which each estolide radical has eight individual acid radicals esterified, and therefore built up of no less than 24 acid radicals, with molecular weights exceeding 6,000. Moreover, the possibility of even higher condensation is not excluded, and Grün has succeeded in so condensing the molecules that complexes of molecular weight at least 12,000 were formed. It may be that, ultimately, we shall have, by suitable linkage manipulation, complexes with molecular weights exceeding 20,000. For the present the estolide glycerides are the highest molecular weight compounds that can be synthesised.

The application of these methods for obtaining such products on a large scale is comparatively simple. It is only necessary to heat the acids, obtained in the usual way, until the desired degree of condensation has been reached, and then esterify with glycerine. All these reactions may be carried out with the help of catalysts, so that no chemical agents at all are used, and the reaction is not limited to 12-oxystearic acid: it may be applied quite easily to ricinoleic acid or to any other oxyacid.

It has occurred to Grün that there is another simple method of obtaining these estolide glycerides, starting with the assumption that the glyceride of an oxyacid is, after all, an alcohol and an ester at the same time, so that an internal interchange of alcohol radicals (alcoholysis) may take place; an acid radical of the glyceride being released and esterified with the hydroxyl group of the oxyacid radical. This esterification or interchange of alcohol radicals may take place in various ways, and the best method has not yet been decided. For the present we know that such reactions are possible. Grün was able to convert the glyceride of a 12-oxystearic acid, such as is obtained by hydrogenating castor oil, into a neutral estolide glyceride by simply heating at high temperature and using a suitable catalyst, such, for example, as tin, glycerin being split off at the same time. He thus indicated a method by which, starting with a neutral glyceride, it is possible to form again a neutral glyceride with one single reaction, the glycerine set free being distilled off:

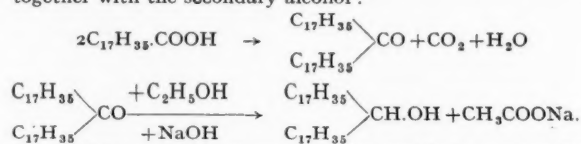


The estolide glycerides, despite their high molecular weight, are liquid at room temperature, and even in the cold they are not solid but somewhat viscous, and remain so at fairly high temperatures.

From the foregoing it will be seen that the hydroxylated fatty acids are valuable raw material for the production of important technical products. In this connection, too, the synthesis of hydroxylated stearic acids should be mentioned, since, although at present of purely laboratory interest only, such a case is of great potential value, permitting, as it does, of the fixing of a hydroxyl group in these oxyacids at any desired point in the carbon chain. Tommecko and Adams have thus synthesised the 9-, 10-, 11-, 12-, and 13-oxystearic acids by treating the aldehyde esters, obtained by oxidising (ozonising) unsaturated acid esters, with the Grignard reagent. They obtained aldehyde esters with 9 carbon atoms by ozonising methyl oleate, those with 10 from the methyl undecylenate, and those with 13 from the methyl erucate. Aldehyde esters with 11 and 12 carbon atoms were built up from undecenyl bromide, forming with potassium cyanide the

undecenyl cyanide which, by saponification, may be converted into the dodecenylenic acid.

In conclusion we may mention some work by Grün, Ulbrich, and Krzel, aiming at the production of high molecular-weight alcohols for the synthesis of waxes. Here, too, as is so frequently the case in the chemistry of fats, synthesis by means of appropriate catalysts has proved highly successful. The above-named workers obtained from fatty acids the corresponding ketones by a method introduced by Esterfield and Taylor, in which the fatty acids are heated with equimolecular amounts of iron at a temperature of  $360^{\circ}\text{C}$ . The yield which, in this case, was only about 80 per cent, becomes quantitative if only the smallest quantity of iron is added. In most cases it is sufficient to work in iron vessels at a temperature not exceeding  $300^{\circ}\text{C}$ ., according to the molecular weight of the fatty acids. In the reduction of the ketones so obtained to secondary alcohols ordinary catalytic hydrogenation is useless. Grün and his collaborators found, however, that the ketones may be converted almost quantitatively into the corresponding secondary alcohols if they are heated at a sufficiently high temperature with the necessary calculated amount of ethyl alcohol and highly concentrated aqueous soda solution, in which case sodium acetate is formed together with the secondary alcohol:



It will be seen from these examples that it is now possible to build up in great diversity the glycerides constituting the natural oils and fats, and that in these syntheses catalysts play a predominant part. The important practical result is achieved that the low grade fatty acids of waste products may be recovered, refined, and with suitable catalysts esterified with glycerin, yielding valuable and perfectly neutral fats of high quality.

Moreover, methods are now available by which fats and fatty acids may be used as the basis or starting-point for valuable technical products; and it would seem that it is in this direction that the future of synthesis in fat and oil chemistry is to be sought, for nature provides us abundantly with fats, the supply of which, at least in the case of vegetable fats, is capable of large increase. There is as yet, therefore, little likelihood of exhaustion of supplies of raw material.

#### The I.G. and Czechoslovakian Chemical Industry

REPORTS from Prague and Berlin indicate that negotiations are proceeding between the I.G. and Czechoslovakian chemical manufacturers, more especially the Ausziger Verein. The negotiations are said to be concerned with the production of dyestuffs and of nitrogenous fertilisers. It is of interest, in regard to the dyestuffs question, that Czechoslovakian textile journals have shown great hostility to the I.G., on the ground that its formation has resulted in increased prices and other conditions detrimental to the textile industry. One suggestion made in the German Press regarding the above-mentioned negotiations is that Czechoslovakian representatives may be invited to be present at the nitrogen conference which will take place on board the ship *Luetzow* in the period April 30-May 8. Hitherto only British, German, French, Italian, Norwegian and Chilean representatives have been mentioned in this connection.

#### German Chemical Society's Report

THE Deutsche Chemische Gesellschaft (German Chemical Society) will hold its annual meeting in Berlin on April 28. The membership of the Society numbers 5,153, as compared with 5,194 in 1926. The number of foreign members has increased, and the decrease in membership is therefore due to loss of members in Germany. The year 1927 closed with a deficit of 29,788 Reichsmarks. At the general meeting Professor H. Wieland, of Munich, will be elected president, and Professors H. Freundlich, of Berlin, and A. Windaus, of Göttingen, as vice-presidents. Sir Ernest Rutherford, P.R.S., has been proposed for election as an honorary member of the Society, together with Professors Einstein, von Lane, and Sommerfeld.

## A Bookman's Column

UNDER the auspices of the National Research Council of the United States, the Chemical Catalog Co. (New York) have published the *Annual Survey of American Chemistry*, Volume II, edited by C. J. West, covering the period July 1, 1926, to July 1, 1927 (pp. 415, \$3.00). The book is divided into 49 chapters, in each of which a well-known American specialist deals with a separate subject. Apart from the usual range of subjects in the fields of pure and applied chemistry, "Microchemistry" (which has received a good deal of attention in the United States of late), and "Co-operative Research Between Industries and Universities" are dealt with. Mention of some of the contributors—e.g., H. S. Taylor, R. W. G. Wyckoff, Roger Adams, P. A. Levene, D. D. Van Slyke—is a sufficient guarantee of the high standard of this publication. An interesting point is that some of the writers end their sections by lists of problems, in their special fields, which require investigation.

In *Theoretical and Experimental Physical Chemistry*, by J. C. Crocker and F. Matthews (J. and A. Churchill, pp. 581, 21s.), the authors, as their choice of title indicates, have kept both aspects of the subject clearly in view. This publication is therefore an endeavour to include in one volume what is usually only to be obtained from several sources. The book is described as being up to the standard of degree and diploma examinations, but many chemists beyond the student stage would probably find it useful. By means of frequent descriptions of apparatus and actual directions for the performance of experiments bearing on the text, the experimental side of the subject is kept well before the reader. Perusal of this book should give readers a clear idea of the position of modern physical chemistry and of the special directions in which it is developing. Both theoretically and experimentally, the information is up to date, as may be exemplified by reference to the practical account which is given of electrometric titration, a subject which, though of great and growing importance, is in most books not sufficiently stressed.

The George Fisher Baker non-resident course of lectures in chemistry, delivered at Cornell University in 1926-27 by Professor Fritz Paneth, of the University of Berlin, are published by the McGraw-Hill Publishing Co. (pp. 164, 12s. 6d.) under rather interesting circumstances. The lectures were delivered in English, were then written in German, and were later re-translated into English by Dr. Martha Doan. The fact that the style bears no trace of ill-effects from this treatment seems to justify the lecturer's tribute to the excellence of the translation. The lectures deal with "Radio-elements as Indicators," and other selected topics in inorganic chemistry.

First published in 1899, Sir James Walker's *Introduction to Physical Chemistry* has found favour ever since, having been revised and brought up to date at frequent intervals. It now appears in its tenth edition (Macmillan and Co., pp. 446, 16s.), and by certain rearrangements and omission of older matter, it has been found possible to incorporate new material and present newer points of view and methods of treatment without increasing the size of the volume. The ground covered is very extensive, including the states of matter, the properties of solutions, the Phase Rule, thermochemistry, chemical equilibrium, electrochemistry, colloids, radioactivity, the structure of atoms, etc. The author's straightforward treatment of his subject, and the large amount of information which he imparts, will probably retain for this book in the future the popularity which it has so long enjoyed.

*Economic Problems in Europe To-day* is the title of an interesting volume edited by W. Henderson Pringle, M.A., LL.B., with an introduction by Sir Charles Grant Robertson (Black, 5s.). Consisting of six lectures delivered in the autumn of last year at the City of Birmingham Commercial College, each by a recognised authority on the country with which he dealt, it is a little treasure house for those who are anxious to obtain an introductory view of the economic position in Europe to-day. To all who are interested in international affairs these lectures should be found of great value.



## Direct Cotton Dyestuffs for Viscose

### A New Method of Selection

It is announced by Courtaulds, Ltd., that during recent work in their laboratories on the determination of the suitability of direct cotton dyestuffs for the dyeing of viscose, another simple test has been developed which enables a more selective gradation to be made between individual dyestuffs than was possible by the suction or capillary test hitherto used. This test, moreover, has the additional merit of eliminating the possible error due to variation in the twist of the threads used by different workers in the suction test. By way of example, Sky Blue FF and Benzo Fast Blue 4GL have suction numbers of 9 and 8 respectively, but large scale work has always shown that the latter dyestuff gave poorer results than the former to a greater degree than one would expect from the small difference in the suction numbers.

### The "Temperature Range" Test

This new test has been called the "temperature range" test and is carried out as follows. Dye liquor sufficient for eight dye tests is made of the dyestuff under examination, and is divided into eight equal volumes (the volume of liquor to viscose was 40 to 1 throughout the work). This ensures that each dye-bath contains the same amount of dyestuff and assistants. Sufficient of the dye liquor was made up for nine dye-baths, to ensure having a surplus over the volume required for eight dye-baths. All the dyestuff, soap and Glauber salt were boiled up in half the total volume of dye liquor, then the remaining half volume was added as cold water. The eight dye-baths were then filled with the dye liquor, which was cooled or raised to the requisite different temperatures. The percentage of the various dyestuffs tested was based on a  $\frac{1}{2}$  per cent. Sky Blue FF shade, so as to give approximately the same depth of shade at 90° C. The assistants used were 2 per cent. soap and 10 per cent. Glauber salt. Courtaulds state that it is absolutely essential that this method should be carried out exactly as detailed above, in order to get reliable results comparable with those obtained by them in establishing this test.

Eight small skeins of viscose are wound from the same commercial skein, which ensures the use of eight viscose skeins of equal dyeing affinity. These skeins are dyed for half an hour in the above eight dye-baths at the following range of temperatures:— 20°, 30°, 40°, 50°, 60°, 70°, 80°, and 90° C. respectively. It will be seen that this test requires no elaborate apparatus, but comes within the scope of the most simply equipped dyehouse laboratory.

### Remarkable Differences in Affinity of Dyes

This test shows extraordinary differences in the affinity for viscose possessed by the various direct cotton dyestuffs. Some dyestuffs like Chrysophenine G and Icy Orange G show maximum affinity at 20° C., which gradually become less as the temperature is raised. Other dyestuffs like Chlorantine Fast Green BL and Benzo Fast Brown GL show minimum affinity at 20° C., but the affinity rises with increase of temperature to a maximum at 90° C. Again, dyestuffs like Pyrazol Orange G and Brilliant Benzo Green B show the maximum affinity at 50°–60° C., whilst the affinity decreases both at the higher and lower temperatures. Experience has shown that those dyestuffs which show maximum affinity for viscose at 20° C. give the most even results in large scale work on commercial viscose, whilst those dyestuffs which show maximum affinity for viscose at 90° C. give the most uneven results in large scale work on commercial viscose. On this basis, a comparative determination of the even dyeing properties of direct cotton dyestuffs on viscose may be accurately made, with the assurance that large scale work will confirm the laboratory determinations.

Not only does this test enable the most suitable dyestuff available for any self shade to be chosen, but it is of still greater value when making the choice of the most suitable dyestuffs available for use in compound shades. The golden rule in choosing dyestuffs for use in compound shades is to select those dyestuffs which dye on at the same rate at the same temperature. Preference should always be given to those dyestuffs which show the maximum affinity for viscose at 20° C. Unfortunately, a full range of dyestuffs with maximum

affinity at 20° C. is not yet available, more particularly in the fastest direct cotton dyestuffs, but this problem is receiving the attention of dyestuff manufacturers. When such a dyestuff is not available, the suitable dyestuff with maximum affinity at the nearest temperature to 20° C. should be chosen. This may best be made clear by examples.

### Practical Applications

The temperature ranges of Sky Blue FF and Benzo Fast Blue 4GL both show maximum affinity at 90° C.; whilst Sky Blue FF shows a certain affinity at 20° C. which gradually increases to a maximum at 90° C., Benzo Fast Blue 4GL shows no affinity at 20° C., but only at 50°–60° C. does it show the same affinity as Sky Blue FF does at 20° C. Therefore, Benzo Fast Blue 4GL dyes more unevenly than Sky Blue FF as determined by this test, which result is confirmed by big scale experience. Even dyeing browns may be built up from combinations of Icy Orange G, Diazo Brilliant Orange GR (used as a direct dyestuff) and Direct Fast Black B, because all three dyestuffs show maximum affinity at 20° C.; if, however, Chlorazol Fast Orange AG is substituted for Icy Orange G, an uneven dyeing combination is produced, because Chlorazol Fast Orange AG shows minimum affinity at 20° C. and maximum at 90° C. Such a combination should not be used, and if the fastness of shade demanded compels the use of Chlorazol Fast Orange AG, then it should be combined with Benzo Fast Light Scarlet 4BL and Benzo Fast Grey BL, because they also show maximum affinity at 90° C.

Although this "temperature range" test shows that dyestuffs which possess the strongest affinity at the lowest temperature are the most even dyeing, it does not mean that they have to be dyed at this low temperature. The rule that viscose should be dyed at as high a temperature as circumstances permit holds good. Those dyestuffs like Icy Orange G which dye viscose perfectly even at 90° C. give uneven results if dyed at 20° C.

## The Making of Coloured Glasses

### A Paper by Dr. W. M. Hampton

AN interesting contribution on "Coloured Glasses" was made by Dr. W. M. Hampton (Chance Bros. and Co., Ltd.) at a meeting of the Birmingham and Midland Section of the Society of Chemical Industry on Friday, March 16.

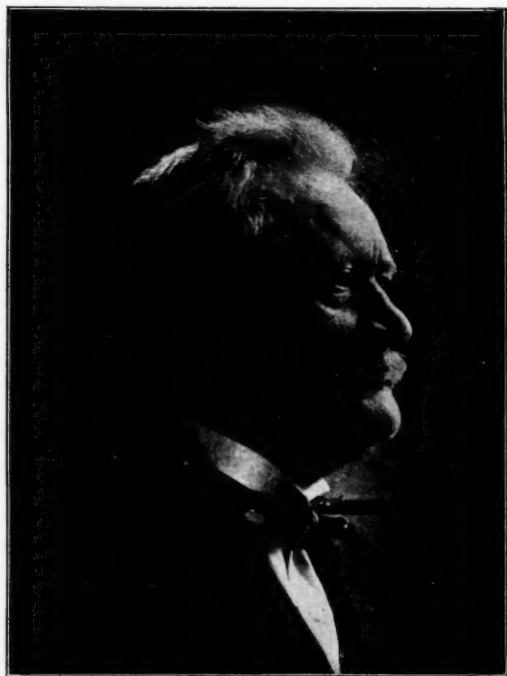
Glasses might be considered, he said, as "congealed liquids," the term "congealed" simply indicating a steady increase in viscosity as the liquid was cooled until at ordinary temperatures it appeared as a solid. The question of viscosity was of fundamental importance in glass manufacture. A glass with 20 per cent. or more of soda would dim rapidly on exposure to damp air and carbon dioxide, and in extreme cases might decompose entirely. The reactions which occurred during fusion were, he said, imperfectly understood. At a temperature below 900° most of the constituents except silica became liquid, but the viscosity was still so high that the gases released and the air trapped in the batch could not escape. Chemical reactions occurred between the constituents, which further complicated the process. The thermal diffusivity of the mixture was so low that a large temperature gradient existed across the pot, with the result that all the possible physical and chemical changes were occurring simultaneously at different points.

Coloured glasses were made either under oxidising or reducing conditions. No two bases gave exactly the same colour with any colouring oxide, but in general the difference was due to the use of various bases. In general, the colours given by various oxides when melted in normal types of glass under oxidising conditions corresponded to those of the salts of the higher oxides. When a reducing mixture was used, completely different colours were obtained. The essential difference between oxidised and reduced glasses was that the oxidised batches gave a coloured silicate, whereas the reduced glasses gave colours which were due to the scattering of light by ultra-microscopic particles of either the oxide or the element itself. The manufacture of coloured glasses, old as it was, was only just emerging from the category of an art into a science.

### The Late Mr. Peter Robertson

MR. PETER ROBERTSON, editor of *The Gas World* (whose death was briefly announced in our last issue), was born at Murthly, Perthshire, in 1863. On leaving school in 1879, he went into the Edinburgh office of the *Glasgow Herald*, and when in 1884 Mr. John Allan, then on the *Herald* reporting staff, left for London to start *The Gas World* (known at first as *Gas and Water*) Mr. Robertson decided to accompany him. He rose from one position to another until in 1918 he was appointed editor. *The Gas World* had by that time passed under the control of Benn Brothers, Ltd., and the ten years of his editorship proved the most successful in the history of the paper. The service of the paper and of the gas industry was the absorbing interest of his life, and up to a few hours before his death he was engaged in his work.

The Committee of the Benn Brothers' Social Circle, in a resolution of condolence, expressing, in the name of all sec-



THE LATE MR. PETER ROBERTSON.

tions of the staff at Bouverie House, their regret at Mr. Robertson's death, and their sympathy with his widow, state: "Mr. Robertson will long be remembered amongst us all as a good Scotsman, with the typical qualities of his race; a good journalist, who set a high standard of devotion to his paper; and a good colleague, whose loyalty and kindness of heart never failed."

At the funeral on Monday at Norwood Crematorium, there was a representative gathering of colleagues and personal friends. Sir Ernest Benn, chairman of the firm, was prevented from attending by the death of his mother, Dame Elizabeth Benn, but the attendance included Mr. Gordon Robbins (deputy chairman), representatives of the board, the Social Circle Committee, and the other journals of the firm, as well as his immediate colleagues on *The Gas World*, Mr. W. T. Dunn, secretary of the Institution of Gas Engineers, and Mr. W. L. Galbraith, secretary of the Gas Light and Coke Co.

### Merchandise Marks: Application Regarding Pumps

THE BOARD OF TRADE give notice that, under the Merchandise Marks Act, 1926, applications in regard to pumps of all descriptions (other than semi-rotary wing pumps) and parts of pumps of all descriptions, have been referred to the standing committee under the Act.

### Death of Elizabeth Lady Benn

WE announce with deep regret the death, which occurred on Sunday, of Elizabeth Lady Benn, widow of Sir John Benn, Bart., and mother of Sir Ernest Benn, chairman of Benn Brothers, Ltd. Lady Benn was closely associated with her husband in all his public work on the L.C.C. and as a member of Parliament, as well as in the numerous social and philanthropic activities in which he was interested, and she was also the helper of her sons in their public work. She was an earnest and active temperance worker, and a supporter for many years of the B.W.T.A., visiting Argentina in 1910 as its representative. When the War came in 1914 two of her sons, Captain Wedgwood Benn and Captain Oliver Benn, and her two sons-in-law, Mr. C. E. Hughes and Mr. A. R. Pain, went on active service. One of them, Captain Oliver Benn, fell in Gallipoli. After her husband's death in 1922 she continued her interests in social and religious work in East London, and the John Benn Hostel for working boys was established in Stepney, and was opened by the Prince of Wales a year ago. Latterly she took an active part in the work of the Rev. James Cregan at Paddington Chapel in a municipal temperance policy. Lady Benn leaves two sons, Sir Ernest Benn, Bt., and Captain Wedgwood Benn, and two daughters, Mrs. C. E. Hughes and Mrs. A. R. Pain. The funeral took place on Wednesday at Limsfield Churchyard, after service at the Congregational Church, Oxted.

Lady Benn's relations with the staff of Benn Brothers, Ltd., were always intimate and cordial, and on their behalf the following resolution of condolence was forwarded to Sir Ernest Benn:—"The Committee of the Benn Brothers Social Circle, on behalf of all sections of the staff of Benn Brothers, Ltd., desire to express to Sir Ernest and Lady Benn and all members of the family the deep regret with which they have heard of the death of Elizabeth Lady Benn. They gratefully recall the keen personal interest that Lady Benn always took in the welfare of the staff, her welcome presence at the various staff functions up to as recently as last month, and her delight in the continuance, through all the recent developments, of the happy and intimate relations that marked the firm's early days. The Committee send this message as a mark of respect for her memory, and of sympathy, in their great loss, with the members of her family."

### Index to British Standard Specifications

THE 1928 edition of the Index to British Standard Specifications and Reports has just been issued. It is a complete subject index, which, in view of the large number (over 300) of British standard specifications now available, some of which include provisions for several articles or materials, will be of much assistance to those purchasing engineering and allied material apparatus and machinery. A numerical list of the specifications is also included. The list, which covers 30 pages, shows the wide range of subjects covered by the British standard specifications, and should be in the hands of all drawing offices and contracts departments of firms throughout the engineering and allied industries as well as the purchasing departments and local authorities, who have found the British standards of such benefit in the preparation of contracts. Copies are available from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 1s. 2d., post free.

### Institution of Chemical Engineers: Corporate Meeting

THE annual corporate meeting of the Institution of Chemical Engineers was held on Friday, March 9, in London, the president, Sir Alexander Gibb, taking the chair. The annual report showed that the membership had increased by 66, amounting at the end of 1927 to 464. The accounts for the year showed a small excess of expenditure over income. The report and accounts were adopted. The following were declared elected: president, Sir Alexander Gibb; vice-presidents, Mr. J. Arthur Reavell and Mr. W. A. S. Calder; hon. treasurer, Mr. F. H. Rogers; hon. secretary, Professor J. W. Hinchley; members of council, Dr. E. W. Smith, Mr. H. Talbot, and Mr. S. G. M. Ure; associate-member of council, Mr. A. J. V. Underwood.

## Production of Phosphate of Ammonia

### Electro-chemical Methods in France

An interesting summary of the present state of the phosphate industry, particularly in France, was recently given by *La Technique Moderne*. The following details, extracted from the summary, deal with phosphate of ammonia.

Ammonium phosphate is for France one of the most important of artificial fertilisers, not only because it permits the simultaneous application to plants of phosphorus and nitrogen, but also because it is possible to obtain it from the natural calcium phosphate of Northern Africa. Taking up the economic production of ammonium phosphate, the Kuhlmann organisation concentrated on the production of phosphoric acid and its transformation into the ammonium salt. In the electric furnace, calcium phosphate is treated with carbon in the presence of silica. The silica displaces the phosphoric acid, which is reduced by the carbon, and the phosphorus is given off as a vapour:  $\text{Ca}_3(\text{PO}_4)_2 + 3 \text{SiO}_2 + 5\text{C} = 2\text{P} + 5\text{CO} + 3\text{CaSiO}_3$ .

This phosphorus is re-transformed into phosphoric acid by burning, so that it can be passed to an ammonia saturator. For such a process to be economic, it is necessary that all the products of the reaction should find some use, either as in themselves, or by employment in other stages of the manufacture. Thus the following three conditions should be fulfilled:—

- (1) The slag should have a commercial value (e.g., it should be suitable for cement). Cement can be obtained by introducing alumina into the fused mass instead of silica.
- (2) The gas from the furnace should find some use. The gas produced is impure carbon monoxide. This gas must be recovered and used for the production of hydrogen.
- (3) By using a reaction similar to the Lillienroth process for the oxidation of phosphorus, it is possible to obtain hydrogen at the same time as phosphoric acid. Sufficient hydrogen would be obtained for the production of ammonia, and, in fact, there would be a surplus.

The Germans appear to have succeeded in realising the first two conditions, but on the other hand they have come to a stop in the industrial application of the Lillienroth process, as they have not yet found a sufficiently powerful catalyst.

### A Group of Industries

From the foregoing it would appear that the electro-chemical process for the manufacture of ammonium phosphate, to be worth while economically, must be associated with other industries centring round the main one and it is therefore a collection of industries rather than a single one. It therefore follows that before embarking on the industrial production of this fertiliser, it is essential to study not only the central process itself, but also those of the secondary industries. It is found necessary to press into service the power of falling water to obtain the energy necessary for the production of phosphorus by the electric furnace, a mill for grinding the clinker, a hydrogen-producing plant, and an ammonia plant to use the hydrogen.

To secure ammonium phosphate at a reasonably low price, it is necessary to produce on a large scale. It is estimated that a minimum annual production of 10,000 tons is required to secure a satisfactory selling figure. Such an output corresponds to an installed power of 10,000 kilowatts, and necessitates a works costing about 30,000,000 francs (£240,000). It is therefore a vast enterprise, which however would be justified by the economies to which it would lead in many national industries. Ammonium phosphate has a redoubtable rival in superphosphate. This has been in use for a long time, and the highly-developed process of manufacture permits of the production of phosphoric acid at a very low price. However, the process is hardly capable of further improvement, while in the manufacture of phosphate of ammonia an important cost reduction is feasible, not so much in the production of the phosphate radicle as in the production of ammonia.

### Production of Methanol

The present process for the production of hydrogen will probably be superseded by a more economical method, brought about by a more judicious and entire use of all the gases from the coke-ovens. With this object in view, experiments on an industrial scale are being carried out by the Kuhlmann organis-

ation, in conjunction with the great coal interests of the north of France. At the Courrières mines, the Kuhlmann interests will soon be producing from coke-oven gases methyl and butyl alcohols. From the same source, the ammonia works will be able to produce carbamide (used as a fertiliser and in the manufacture of certain synthetic resins). Still with a view to the complete utilisation of the furnace gases, the Kuhlmann organisation has endeavoured to bring together the production of methyl alcohol and ammonia, the second by using as a primary source the residual gases from the first operation.

## Applications of Absorption Spectrography

### Paper by Mr. Twyman

At a meeting of the Manchester and District Section of the Institute of Chemistry, on Wednesday, March 14, Mr. F. Twyman, F.R.S., of Adam Hilger, Ltd., read a paper entitled "Absorption Spectrography and Some of its Applications to Chemistry." Mr. L. Guy Radcliffe presided.

Mr. Twyman pointed out that of the light lost by reflection, diffusion, and absorption in passage through a medium, it was that lost by absorption which was peculiarly of interest to chemists. For very many years it had been felt by all investigators on the subject that there was a profound connection between the amount of radiation absorbed by a substance at each wave length and the chemical constitution of the substance. The conviction that the cause of this "rapport" was in the nature of a resonance of the particles of which the substances were composed, whether electrons, atoms, or molecules, had grown with the development of modern physics, and quantum notions had been applied to absorption with very stimulating effect.

### Measurements of Absorption

All measurements of absorption must necessarily be derived from measurements of the loss of light, in which were included loss due to reflections at surfaces and to scattering, or to give it its other name, diffusion. Since it was only the absorption which was significant for the chemist, he must always, in making measurements, be sure that these other losses were compensated for, and these remarks applied to radiations in the infra-red and ultra-violet equally with those in the visible region.

The light reflected from the surfaces between two transparent media depended solely on the refractive indices of the two media and on the angle of incidence. Fresnel's equations, which were given in practically all text books on light, enabled the loss from reflection to be very simply calculated, or the loss could be automatically compensated for by arranging that another non-absorbing substance, with reflecting surfaces similar to that to be measured was used for comparison. For instance, in measuring the absorption of a liquid in a cell, one could use for comparison an exactly similar cell containing some liquid of approximately the same refractive index but without absorption in the region which was under observation.

### Obviation of Surface Scattering

Scattering at the surface of the substance must not be permitted, i.e., the surface must be well polished. Failure in this respect was easily seen by the eye where visual light was concerned, but this was not always a sufficient safeguard against diffusion of light in the ultra-violet, for this might occur, although to the eye both surface and interior were perfectly clear. To deal with the question of diffusion in the interior was sometimes difficult, and it must suffice for the moment to insist on the necessity of always bearing it in mind, particularly when making measurements in the ultra-violet and infra-red, where scattering might be present although to the eye the substance seemed perfectly clear.

Lambert's law and Beer's law and the terminology of the subject were also dealt with. Descriptions of instruments for the visible, ultra-violet and infra-red regions of the spectrum then followed, with notes on suitable light sources and methods of using the apparatus. The paper concluded with an account of the multitudinous applications of the method to theoretical and applied chemistry. Numerous lantern slides were shown to illustrate points dealt with.



## Official Russian Chemical Bodies

### A Resume of the Present Position

THE Russian Academy of Sciences consists of a large number of affiliated institutions, including various chemical ones, and has recently published a survey of them.

The Chemical Institute developed from the chemical laboratory founded in 1748 by Lomonosov, one of the first Russian chemists, and such well-known chemists as Frizsche, Zinin, Butlerov, and others have worked in it. In 1924 the laboratory was transformed into the Chemical Institute with two departments: general and organic chemistry, high pressures and high temperatures. In connection with the Institute are working some of the institutes of the Commission for the Study of Natural Resources. The department of general chemistry, under N. S. Kurnakov, is working at present mainly on problems of physico-chemical analysis, pure and as applied to the study of ores and minerals. The second department, under V. N. Ipatiev, is studying the action of high pressures and temperatures on chemical compounds.

The Commission for the Study of Natural Resources was founded in 1915 on the initiative of its present president, V. I. Vernadsky, with the view of studying systematically the natural resources of Russia. In accord with its diversity of functions, the Commission has a number of working branches, as follows: Institute of Physico-Chemical Analysis, working on analyses of salt deposits in the Caspian Sea, metallic ores, etc.; Institute for the Study of Platinum and other Noble Metals, studying methods of analysis of platinum ores and the extraction of the metal from them; the Gaseous Section, which studies natural gases, mainly from the point of view of the presence in them of helium for aviation purposes; and various others.

## Ramsay Laboratory Dinner

### Sir Alfred Mond's Appeal

VISCOUNT CHELMSFORD, chairman of University College Committee, was host at a dinner to members of the Chemical Engineering Committee and others associated with chemical industries, given on Wednesday evening at University College, London. The guests of honour included the first Ramsay Professor (Mr. E. C. Williams), and the Ramsay Professor-elect (Dr. W. E. Gibbs).

An appeal on behalf of the Ramsay Memorial Laboratory of Chemical Engineering building and endowment fund is being made by Sir Alfred Mond, chairman of the committee. Of the £50,000 capital required, subscriptions to the amount of £23,555 have already been received. Sir Alfred Mond proposed "The Department of Chemical Engineering." It might be asked, he said, how it was that they existed so long in this country without a school devoted specially to chemical engineering. In the past the work had to be learned in the factory, but that was not the most satisfactory method. The continuance and development of the School of Chemical Engineering would enable them to reap the fruits of the hard experience of the war. Professor E. C. Williams and Dr. W. E. Gibbs responded. The Chairman submitted "The Chemical Engineering Committee," to which Sir David Milne-Watson replied.

Among other guests present were: Lord Gainford, Sir Gregory Foster, Professor Donnan, Mr. Emile Mond, Mr. W. J. U. Woolcock, Professor Collie, Professor Ernst Cohen, Mr. H. T. Tizard (Department of Scientific and Industrial Research), Mr. Robert Mond, and Sir Frederic Nathan.

### The Individualist Luncheon

MR. F. W. HIRST, the political economist, was the principal speaker at the Individualist luncheon at the Hotel Cecil, on Wednesday. Mr. H. Gordon Selfridge presided. Mr. Hirst claimed that the ideal individualist was not a selfish trader in the sense that he wanted special privileges for himself. His was an enlightened selfishness. He knew that if he asked the State for a subsidy or a protective duty he was asking for an injustice, a grant in aid at the expense of his fellow taxpayers and consumers. If all producers got equal protection or subsidies the result would obviously be ruinous to the Exchequer and useless to the receivers. Privileges for all were privileges for none.

## Chemical Matters in Parliament

### Dyestuffs Imports

In reply to Sir John Power (House of Commons, March 20), the President of the Board of Trade stated that the imports into the United Kingdom of synthetic dyestuffs amounted to 40 million lb. weight in 1913, and to 4½ million lb. weight in 1927. Production in the United Kingdom amounted to about 9 million lb. weight in 1913, and to 35½ million lb. weight in 1927. He understood that the average price of these dyestuffs was at present about 1s. 7d. a lb., as compared with 1s. a lb. in 1913.

### Dyestuffs Import Regulations

Mr. Fenby asked the President of the Board of Trade (House of Commons, March 20) what percentage of the value of the material proposed to be imported representing dyestuffs of British origin was required before there was sufficient ground for the issue of a licence under Section 2 (4) of the Dyestuffs (Import Regulation) Act? In reply the President of the Board of Trade said that the hon. Member would see from Section 2 (4) of the Act that it was necessary for the Licensing Committee to be satisfied that the goods, to which an application for a licence related, were wholly produced or manufactured in some part of His Majesty's Dominions. In a further question Mr. Fenby asked: (1) whether it was necessary for the 40,000 users of imported coloured inks, manufactured in America with British dyes, to make individual representations to the Dyestuffs Advisory Licensing Committee, giving detailed information as to their specific requirements and definite evidence showing precisely in what respects the drawing inks obtainable from British sources were unsatisfactory for their purpose; and under what provision such imported inks were refused importation to this country; (2) why, as there was no prohibition on the importation of articles treated by dyestuffs, British or other, coloured inks from America manufactured with British dyestuffs were now held up at the London Docks?

Sir P. Cunliffe-Lister, in his reply, said that he informed the hon. member on February 28 that importation of inks which were "synthetic organic dyestuffs, colours or colouring matters," was prohibited by the Dyestuffs (Import Regulation) Act. The Licensing Committee, constituted under the Act, were, however, prepared to consider representations from any users who claimed that they were unable to obtain satisfactory inks of British manufacture.

### Aviators and Exhaust Fumes

In reply to a question by Lieut.-Col. Howard-Bury (House of Commons, March 21), as to whether Flight-Lieut. Kinkead was using some form of ethyl petrol and whether there was truth in the rumour that the fumes incapacitated him, Sir Samuel Hoare stated he required notice of the question, but he could say in a sentence that there was no evidence to show that the fumes had anything to do with the accident.

## General Meeting of International Paint and Compositions

SPEAKING on Thursday, March 15, at the twentieth ordinary general meeting of the International Paint and Compositions Co., Ltd., Sir William Maxwell said that the acquisition of the Standard Antifouling Composition and Paint Co., who had contracts running over a period of years with shipping organisations, had given them not only direct profit, but an increased turnover. There were still four years of these contracts to run, and the directors confidently hoped that this would not be the end of them. The despatched output from Felling during the year showed a substantial increase, and when they considered that their associated companies in every part of the world took away business that formerly went to Felling they had reason to be more than satisfied that their principal factory in the United Kingdom maintained its own, not only in the company's long-established wares, but also in new commodities.

### The Saville Shaw Medal

AT A MEETING OF THE SOCIETY OF CHEMICAL INDUSTRY at Newcastle on Wednesday, March 28, the Saville Shaw Medal will be presented to Mr. James Stevenson for his work on the reaction between sulphuretted hydrogen and hydrated ferric oxide at a temperature of 50° C.

## From Week to Week

LORD WEIR is one of three new directors appointed to the board of the International Nickel Co.

THE CHEMICAL ENGINEERING GROUP will hold a joint meeting with the Society of Chemical Industry (Birmingham and Midland Section) on April 20.

THE CONTRACT FOR 2,200 tons of steel work for the boiler-house for the extension to the Billingham Works of Synthetic Ammonia and Nitrates, Ltd., has been placed with Redpath, Brown and Co., Ltd., of Edinburgh.

WHILE ATTENDING A MACHINE known as "the Iron Man," used for lifting superphosphate at the Anglo Continental Guano Works, Silvertown, early on Saturday, March 17, William Hames had his foot caught by a moving chain and was severely injured. He was removed to Whipps Cross Hospital.

RECENT WILLS INCLUDE: Mr. Robert Percy Sellon, managing director of Johnson, Matthey and Co., Ltd., metallurgists and refiners, £105,932 (net personalty, £97,939).—Mr. Charles Edwin Dovey, chairman of the Cardiff Gas, Light and Coke Co., £113,896 (net personalty, £83,286).

THE CHEMICAL INDUSTRY CLUB, owing to the generosity of two members, has been enabled to start refurnishing the Club rooms in order to make them more comfortable and more attractive. At the recent annual dinner, the chairman stated that it had been decided to open a special fund for defraying the cost of these improvements.

SIR WILLIAM HARDY, F.R.S., will be the guest of honour at this year's colloid symposium, to be held at Toronto, June 14-16. Sir William Hardy is a member of the advisory council of the Department of Scientific and Industrial Research and director of food investigation to the Department. He has done much research work on the physico-chemical aspects of lubrication and adhesion.

A LARGE INCREASE IN DELIVERIES is reported by Aikman (London) Ltd., in their current circular on the nitrate markets. In the first half of this month deliveries in Europe and Egypt amounted to about 161,000 tons, which compares with 69,000 tons and 98,000 tons in the first half of March, 1927 and 1926 respectively. This brings the total deliveries since July 1 last up to 867,000 tons.

THE MANCHESTER CORPORATION is making investigations with regard to smoke abatement. According to Mr. R. M. Rowe, technical, chemical and smoke inspector to the Corporation, experiments have recently been made at the Town Hall in the use of coalite, the smokeless residual fuel of low temperature carbonisation, in open grates, and these are now to be repeated on an extended scale. It is understood that there will be a three months' trial at the Town Hall, in civic buildings, and in the hospitals.

DR. W. R. ORMANDY, of the Institution of Petroleum Engineers, is an associate member of the Mechanical Warfare Board, the formation of which is announced by the War Office. This body will replace the Mechanical Transport Advisory Board and the Tank and Tracked Transport Technical Committee. The board will act in an advisory capacity on technical problems in connection with mechanised transport of all types for Army requirements, and secure liaison with the mechanical engineering industry, so that the Army may be in close touch with engineering progress and commercial production.

UNIVERSITY NEWS.—*London*: A Keddey Fletcher-Warr student-ship has been awarded to Mr. Charles Percy Snow, B.Sc., for the study of molecular spectra with special reference to molecular structure.—*Manchester*: The Council has accepted the resignation of Dr. Robert Robinson, Professor of Organic Chemistry, on his appointment to the Chair of Organic Chemistry at University College, London.—*Birmingham*: Professor W. N. Haworth, D.Sc., of the Chemistry Department, Birmingham University, delivered recently several lectures on "Sugars" in Switzerland; and Dr. Fichter, who is a Swiss authority on electro-chemistry, will pay a return visit to Birmingham University in May. During the two weeks beginning May 7 he will give seven lectures, to which members of technical associations will be invited.

THE ANNUAL MEETING of the Bristol and South-Western Counties Section of the Institute of Chemistry was held on Tuesday, March 13 in the University of Bristol Chemistry Lecture Theatre. The following are the officers of the section for the ensuing year:—Dr. T. Malkin, Mr. Edward Russell, Mr. R. D. Littlefield, Mr. F. O'Brien, Mr. H. F. Barke and Professor W. H. Lewis, members of the committee; Mr. A. W. M. Wintle, district member of the Council; Mr. F. H. C. Bull and Mr. A. E. Jones, auditors; Mr. A. W. M. Wintle, hon. secretary and treasurer. Following the election of the officers, Sir Ernest Cook gave an address on "Some Early Bristol Chemists," in which he mentioned Jonathan Jacobs (A.D. 1220), who produced resistant concrete; Thomas Norton (A.D. 1440); Peregrine Phillips, the inventor of the contact process of making sulphuric acid; Humphry Davy; William Herapath; his sons, William Bird and Thornton John Herapath; and Thomas Coomber.

THE BIOCHEMICAL SOCIETY will hold a meeting in Birmingham in May.

A COPPER INSTITUTE has been formed in the United States to further the interests of the producers of copper.

INDIAN INDIGO EXPORTS in January, 1928, amounted to 169 cwt., as compared with 261 cwt. in the same period in 1927.

THE TOTAL VALUE of the dyes and colours exported by the German dye industry in 1927 was 337,000,000 marks, compared with 293,200,000 marks in 1926, and 277,600,000 marks in 1925.

SIR ALFRED MOND, M.P., interviewed this week on returning from his tour in the East, said of the scheme for extracting chemicals from the Dead Sea: "It is an interesting speculative proposition."

DEATH BY MISADVENTURE was the verdict returned at an inquest at Widnes, on March 13, on John Davies, who died from burns received through falling into a tank of caustic soda which he was engaged in testing at Gossage's Soap Works.

THE FIRST JOINT MEETING of the special committee appointed by the General Council of the Trades Union Congress and by the representative group of employers, to consider the agenda for the industrial conference, was held at Burlington House on Wednesday, Sir Alfred Mond presiding.

IN THE HOUSE OF REPRESENTATIVES on Wednesday, Mr. Bruce, the Prime Minister of Australia, replying to questions, said the Government had been asked to consent to the introduction of £2,000,000 of German capital, to develop the coalfields and to erect a coke by-product treatment plant.

PORT SANITARY AUTHORITIES are warned by the Ministry of Health of the danger of using hydrocyanic acid gas for fumigating ships, except with the strictest precautions. The gas should only be used, it is stated, by at least two highly experienced persons wearing gas masks, and with a first-aid outfit at hand.

THE VEREINIGTE ALUMINIUMWERKE A.G. (Lautawerk), belonging to the German Government, have recently consolidated and extended their interests. By participation in the Zurich Bauxitgesellschaft a supply of raw material has been ensured. An interest has also been secured in the Vereinigte Leichtmetallwerke with a view to the further development of aluminium alloys, and in certain rolling mills in Bavaria. An Italian subsidiary is to be formed.

THE FOLLOWING NEW OFFICERS of the Birmingham and Midland Section of the Society of Chemical Industry were elected at a meeting held on Friday, March 16: president, Mr. W. A. S. Calder (Chance and Hunt, Ltd.); vice-chairmen, Mr. J. C. Mann (Midland Tar Distillers, Ltd.), and Dr. W. H. Brownson (Kynochs); hon. treasurer, Mr. W. T. Collis (Midland Tar Distillers, Ltd.); hon. secretary, Mr. G. King (Albright and Wilson, Ltd.); committee, Mr. A. W. Knapp, Mr. J. H. Johnson, Mr. W. R. Barclay, Dr. W. Wardlaw, and Mr. W. Dickson.

TENDERS ARE INVITED for the following: Four hundred tons of aluminium sulphate for sewage purification, samples to be submitted for analysis to the Chairman, River Committee, Town Hall, Salford, by noon, April 3; supplies of tar, creosote oil, and pitch for Dublin Borough Commissioners, the tenders to be lodged by March 30 with Supplies Department, Lord Edward Street, Dublin; and one hundred tons of refined tar (Road Board Specification No. 1), sealed tenders to be submitted to J. H. Sharp, Surveyor's Office, Benn Buildings, Rugby, by the first post on March 28.

AT THE INQUEST, on March 15, on Flight-Lieut. Kinkead, who was killed in an aeroplane accident on March 12 while attempting to break the world's air speed record, it was stated that he was using in the engine a special mixture of spirit containing lead tetraethyl; this, however, was not the ordinary commercial brand, and had only been in use on the Super-marine Napier S5. It was further stated that Flight-Lieut. Kinkead had felt the fumes of the exhaust to a minor extent after a flight in the Schneider Cup race. A specimen of his blood and lungs was sent to Halton Laboratory to ascertain if any tetraethyl lead or carbon monoxide were present. The result of the analysis will be disclosed at the resumed inquest on March 26.

THE ANNUAL MEETING of the Liverpool Section of the Society of Chemical Industry was held on Friday, March 16. Increased interest in the activities of the organisation was reported. The following officers were elected: chairman and hon. treasurer, Dr. Alfred Holt; vice-chairman, Associate Professor W. H. Roberts; hon. secretary, Mr. E. Gabriel Jones; representative on Chemical Engineering Group, Mr. W. Ramsay Sibbald; and to vacancies on the committee, Professor C. O. Bannister, Colonel E. Briggs, Dr. C. H. Clarke, and Mr. F. C. Guthrie. Mr. W. Doran, of the department of organic chemistry, Liverpool University, afterwards read a paper dealing with recent developments in micro-chemical technique, supplemented by an exhibition of micro-chemical apparatus for both qualitative and quantitative work, according to the methods of Emich, Pregl, and others.

### Obituary

MR. CHARLES WIDDINGTON TINTING, aged 64, president of the National Drug and Chemical Co., Montreal, on Friday, March 16.

## References to Current Literature

## British

- COLLOIDS.—The kinetics of coagulation. B. N. Desai. *Trans. Faraday Soc.*, March, pp. 181-195.  
A chemical method of preparing carbon hydrosol. E. Chirnoaga. *J. Chem. Soc.*, February, pp. 298-301.
- CORROSION.—The practical problems of corrosion. III. The formation of rust and its consequences. IV. The corrosion of wrought iron in relation to that of steel. U. R. Evans. *J.S.C.I.*, March 9, pp. 55-62, 62-69.
- GENERAL.—Properties of powders. IX. The scattering of light by graded particles in suspension. T. M. Lowry and M. C. Marsh. *Trans. Faraday Soc.*, March, pp. 195-201.
- ORGANIC.—Hydrogenation of cyclic compounds under pressure in presence of osmium and other catalysts. V. S. Sadikov and A. K. Mikhailov. *J. Chem. Soc.*, February, pp. 438-448.  
Nitrosation of phenols. V. Preparation of an *o*-nitrosophenol. H. H. Hodgson and J. S. Wignall. *J. Chem. Soc.*, February, pp. 329-332.  
Syntheses in the phenazine series. H. McCombie, H. A. Scarborough, and W. A. Waters. *J. Chem. Soc.*, February, pp. 353-359.
- WOOL.—The nitrogen content of natural and processed wool. J. Barritt. *J.S.C.I.*, March 9, pp. 69-72.

## United States

- DYEING.—Influence of moist heat on ice colours. A study of the effect of rayons dyed with naphthol-AS colours. A. Ruperti. *Rayon Journal*, February, pp. 26-29.  
Rayon dyeing precautions. The part played by Monel metal. A. E. Hanson. *Rayon Journal*, January, pp. 26-29, 44.
- GENERAL.—A method of fractionating natural gasoline. D. B. Keyes. *Chem. Met. Eng.*, February, p. 92.
- MASS PRODUCTION.—Applying mass production methods in a pharmaceutical plant. T. R. Olive. *Chem. Met. Eng.*, February, pp. 79-83.
- ORGANIC.—The calcium salt of paraiodoguaiacol and paraiodoguaiacol carbonate. F. R. Greenbaum. *Amer. J. Pharmacy*, February, pp. 112-115.
- PLANT.—Five years' progress in carbon electrode technology. C. L. Mantell. *Chem. Met. Eng.*, February, pp. 84-85.  
Mullite refractories extend field of high-temperature operations. W. A. Koehler. *Chem. Met. Eng.*, February, pp. 86-88.  
Electrical heating field broadened by container-resistance. R. A. Carleton. *Chem. Met. Eng.*, February, pp. 102-104.

## German

- ADSORPTION.—The adsorption of substances dissolved in water by inactive and active charcoals. K. Skumburdis. *Kolloid-Zeitschrift*, February, pp. 127-133.
- ANALYSIS.—The analysis of anthracene and anthraquinone. H. Pirak. *Zeitschrift angewandte Chem.*, March 3, pp. 231-233.
- COLLOIDS.—A new method for the preparation of colloidal solutions of gold. The qualitative and quantitative determination of very small quantities of gold. D. Nider. *Kolloid-Zeitschrift*, February, pp. 139-140.  
The kinetics of peptisation. A. v. Buzágh. *Kolloid-Zeitschrift*, February, pp. 156-162.
- CONCRETE.—The non-hardening of weak concrete mixes. B. Garre. *Zeitschrift anorganische Chem.*, Vol. 169, Part 4, February 11, pp. 301-304.  
The effect of lead monoxide on the hardening of Portland cement. B. Garre. *Zeitschrift anorganische Chem.*, Vol. 169, Part 4, pp. 305-308.
- DYEING.—The dyeing of acetate silk and mixed fabrics. G. Rudolph. *Kunstseide*, February, pp. 53-55.  
The need for colour standardisation. B. Teufer. *Kunstseide*, February, pp. 55-58.
- GENERAL.—The catalytic chlorination of glacial acetic acid to monochloroacetic acid. H. Brückner. *Zeitschrift angewandte Chem.*, March 3, pp. 226-229.  
The activation of hydrogen by the contact action of palladium. M. Polyakoff. *Naturwissenschaften*, February 24, p. 131.

The working hypotheses of experimental chemotherapy. R. Schnitzer. *Naturwissenschaften*, February 17, pp. 105-111.

- On a generally applicable method for the preparation of fibrous precipitates of any substance, and on the structure of fibres, especially cellulose fibres. P. P. v. Weimarn. *Kolloid-Zeitschrift*, February, pp. 163-166.
- The Lilienfeld patents and their economic significance. C. Claessen. *Chemiker-Zeitung*, March 7, pp. 189-190.
- Coal dust and its dangers. *Chemiker-Zeitung*, March 10, pp. 201-202.
- Reactions and derivatives of iron carbonyl. W. Hieber and F. Sonnekalb. *Berichte*, March 7, pp. 558-565.
- ORGANIC.—An activated form of oxalic acid. F. Oberhauser and W. Hensinger. *Berichte*, March 7, pp. 521-533.
- TANNING.—Advances in the domain of the chemistry and technique of tanning. O. Gerngross. *Zeitschrift angewandte Chem.*, March 3, pp. 221-226.
- VISCOSITY.—Apparatus for the determination of viscosity under differing conditions, and a discussion of the errors derived from changes in the velocity of the moving liquid, from surface tension, and from buoyancy due to the air. E. Masters and A. E. Goddard. *Berichte*, March 7, pp. 586-591.

## Miscellaneous

- GENERAL.—The decomposition of carbon monoxide in the presence of reduced nickel. S. Horiba and T. Ri. *Bulletin Chem. Soc. Japan*, January, pp. 18-25 (in English).  
Describes an improved apparatus for the investigation of contact catalysis. It is inferred from the results that the decomposition of carbon monoxide in the presence of reduced nickel is a monomolecular reaction in the vicinity of 230° C.  
The deviation of gaseous mixtures from Dalton's Law of partial pressures due to chemical causes. III. Hydrogen chloride and methyl alcohol. J. Shidei. *Bulletin Chem. Soc. Japan*, January, pp. 25-42 (in English).  
The preparation of pure water without distillation. Electro-osmosis. P. Patin. *Chim. et Ind.*, February, pp. 205-213 (in French).  
Effect of anti-knock materials on the limits of inflammability of ethyl ether and hydrocarbons. Y. Nagai. *J. Soc. Chem. Ind. Japan* (supplemental binding), February, pp. 48-52B (in English).
- LOW-TEMPERATURE CARBONISATION.—Low-temperature distillation of coal briquettes. P. Weiss. *Chim. et Ind.*, February, pp. 195-204 (in French).
- OILS.—Halibut and flat-fish liver oils. M. Tsujimoto. *J. Soc. Chem. Ind. Japan* (supplemental binding), February, pp. 38-40B (in English).
- ORGANIC.—Research in the artificial musk group. I. R. de Capeller. *Helvetica Chim. Acta*, Vol. XI, Part 1, pp. 166-170, 170-172 (in French).  
The elimination of side chains in the nitration of aromatic compounds. H. Barbier. *Helvetica Chim. Acta*, Vol. XI, Part 1, pp. 157-161 (in French).  
The condensing properties of mixed magnesium alcoholates. V. Grignard and M. Fluchaire. *Annales Chim.*, January-February, pp. 5-54 (in French).  
Researches on the action of mixed organo-magnesium compounds on some aromatic N-diethylamides and on the tetraethylated phthalic diamides. N. Maxim. *Annales Chim.*, January-February, pp. 55-111 (in French).  
On the condensation products of phenols and aldehydes. XI. Some properties of intermediate products. T. Shono. *J. Soc. Chem. Ind. Japan* (supplemental binding), February, pp. 29-30B (in English).  
Nitration by means of nitrogen peroxide. M. Battagay. *Bulletin Soc. Chim. France*, February, pp. 109-134 (in French).
- SUGARS.—Synthesis of lactose. A. Pictet and H. Vogel. *Helvetica Chim. Acta*, Vol. XI, Part 1, pp. 209-215 (in French).  
The history of the methylpentoses and the actual state of their chemistry. E. Votoček. *Bulletin Soc. Chim. France*, January, pp. 1-29 (in French).



## Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

### Abstracts of Complete Specifications

- 285,551. VANILLIN AND *i*-VANILLIN, PROCESS FOR THE PREPARATION OF. F. Boedecker, 98, Schweinfurthstrasse, Berlin-Dahlem, Germany. Application date, November 16, 1926. Addition to 285,156.

Specification No. 285,156 (See THE CHEMICAL AGE, Vol. XVIII, p. 247) states that on heating safrol with an alcoholic alkali or an alkali alcoholate the pyrocatechin derivative substituted by the alkoxy-methyl radicle in the meta position to the propenyl group is formed together with the product substituted in the para position. It is found that the sodium salts of the two propenyl-pyrocatechin-monomethoxy-methyl ethers have a great difference of solubility in water, alcohol, etc., and it is therefore possible to separate the slightly soluble sodium salt of the isoeugenol derivative (3-alkoxy-methyl-1-propenyl-3:4-pyrocatechin) from the more easily soluble isochavibetol derivative (4-alkoxymethyl-1-propenyl-3:4-pyrocatechin), and these can be converted into the isomeric propenylpyrocatechin-methylethers or the corresponding aldehydes. The 4-alkoxy-methyl-1-propenyl-3:4-pyrocatechin is converted into vanillin by the process described in Specification No. 285,156, and the 3-alkoxy-methyl-1-propenyl-3:4-pyrocatechin or its sodium salt is converted into the 4-benzyl-3-alkoxy-methyl-ether. This is decomposed by dilute acids, and the hydroxyl group liberated fixed by the methyl radicle, the benzyl methyl-ether obtained being converted into benzyl-vanillin and then into vanillin. Several examples are given.

- 285,555. VAT DYE STUFFS OF THE ANTHRAQUINONE SERIES, MANUFACTURE OF. W. Carpmal, London. From I. G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, November 16, 1926.

These dyestuffs are obtained by heating a 2-halogen-1:9-pyrazol anthrone with an acid combining agent, and a catalytic metal or metal compound such as copper or a copper salt. The acid combining agent may be an alkali acetate. An example is given of the treatment of 2-bromo-1:9-pyrazol anthrone to obtain a dyestuff which gives blue shades on cotton, becoming red on exposure to the atmosphere. The 2-bromo-1:9-pyrazol-anthrone is obtained by converting 1-amino-2-bromo-anthraquinone into the diazo compound from which the hydrazine derivative is produced and then converted into the pyrazol anthrone derivatives by internal condensation.

- 285,564. EXTRACTION OF PETROLEUM PRODUCTS FROM BITUMINOUS MATERIAL, PROCESS FOR. P. Dvorkovitz, 24, Cambridge Gardens, Kensington, London. Application date, November 17, 1926.

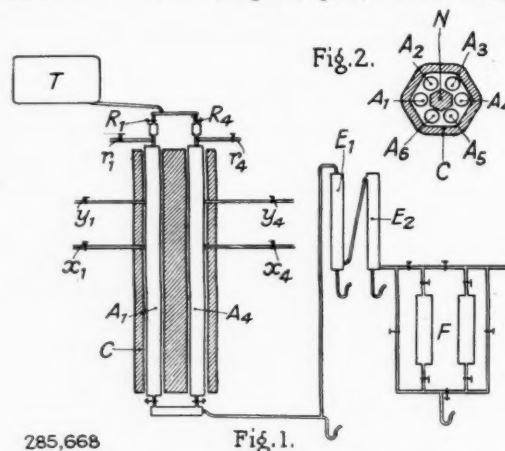
Bituminous material is heated in a retort to distil off part of the organic material, and a solvent is then added in the form of a liquid or a vapour which will dissolve the remaining organic matter. The solvent may be gas tar or petroleum which acts only to dissolve the organic matter and leaves the retort in practically the same condition as when it entered.

- 285,598. BARBITURIC ACID SOPORIFICS, MANUFACTURE OF. O. Y. Imray, London. From I. G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, December 7, 1926.

These compounds are obtained by wholly or partly substituting esters of alkinols for esters of the saturated alcohols in the usual alkylation methods for preparing barbituric acid soporifics. Thus, when starting from mono-alkyl-malonic acid esters, alkyl-alkinyl-malonic acid esters are obtained, which may then be treated with urea and alkylates to obtain the corresponding barbituric acid compounds. These substances may also be obtained by treating the monoalkyl-barbituric acids salts with the above-mentioned esters. Compounds containing an alkenyl group and an alkynyl group may also be obtained. Examples are given of the preparation of isopropyl-propargyl-barbituric acid, isopropenyl-propargyl-isopropyl-barbituric acid, and propargyl-diethyl-methine-barbituric acid.

- 285,668. CONVERTING HEAVY HYDROCARBONS INTO LIGHT AND STABLE HYDROCARBONS, PROCESS AND APPARATUS FOR. P. Grené, 65, Rue de Rome, Paris. Application date, March 21, 1927.

The object is to convert tars and oils derived from the distillation of coal, tars, lignite, peat, schist, etc., into



light hydrocarbons. The hydrocarbons are heated in the presence of a non-metallic catalyst such as activated carbon, coke, semi-coke, wood charcoal, etc. The production of gas from the hydrocarbons is prevented by diluting the vapour and maintaining it at a constant concentration. The hydrocarbons are preferably freed from sulphuretted hydrogen and the other sulphur compounds are converted into sulphuretted hydrogen by the aid of the same catalysts. The sulphuretted hydrogen is removed by means of metallic oxides, such as oxides of manganese and tin, preferably in the form of the minerals pyrolusite and cassiterite. The hydrocarbons derived from the process may be hydrogenated by means of hydrogen produced from oxide of carbon and water vapour in the same apparatus.

The apparatus consists of six vertical tubes,  $A^1 \dots A^6$ , arranged in a circle in a refractory casing C having a central core N. The tubes contain four layers, a hydrogenation catalyst, such as reduced nickel at the bottom, and then in succession the carbonaceous substance employed for the production of hydrogen, a layer of pyrolusite, and, finally, the carbonaceous substance for the cracking reaction. The hydrocarbons to be converted are supplied from a tank T through valves  $R^1 \dots R^6$ , and the diluent gases, which include oxide of carbon, are supplied through valves,  $r^1 \dots r^6$ . The mixture of cracked vapour and sulphuretted hydrogen produced in the upper layer passes downwards through the pyrolusite, which retains the sulphur while the hydrogen unites with the oxygen of the oxide to produce water vapour for the subsequent catalytic reaction with the oxide of carbon. The mixture then passes through the carbonaceous catalyst where hydrogen is produced, and then through the hydrogenation catalyst. The products pass to two condensers,  $E^1$ ,  $E^2$ , and the remaining gases are then treated with active carbon in cylinders F, which are used alternately; in each case the condensate is drawn off. The tubes  $A^1 \dots A^6$  are provided with pipes  $x^1 \dots x^6$  and  $y^1 \dots y^6$  at the appropriate levels, whereby air may be blown into the pyrolusite layer and sulphur-containing gases drawn off.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—257,270 (I.G. Farbenindustrie Akt.-Ges.), relating to purification of the liquid hydrocarbons from the destructive

hydrogenation of carbonaceous materials, see Vol. XV, p. 433; 259,982 (Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler), relating to pyridine derivatives, see Vol. XV, p. 620; 261,755 (Koppers Co.), relating to gas purification, see Vol. XVI, p. 121; 265,920 (Goodyear Tyre and Rubber Co.), relating to vulcanising rubber, see Vol. XVI, p. 382; 267,885 (H. Petersen), relating to manufacture of sulphuric acid, see Vol. XVI, p. 515; 267,972 (F. W. Corsalli), relating to melting metals, see Vol. XVII, p. 7 (Metallurgical Section); 272,951 (Consortium für Elektro-Chemische Industrie Ges.), relating to acetic anhydride, see Vol. XVII, p. 200; 275,145 (H. Wittek), relating to extraction of phosphorus from its compounds, see Vol. XVII, p. 311.

### International Specifications not yet Accepted

283,840-1. SYNTHETIC RUBBER. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. International Convention dates January 14 and January 15, 1927.

283,840. Hydrocarbons such as butadiene, isoprene and dimethyl-butadiene are emulsified in an inert aqueous liquid or solution or viscous liquid such as soap solution, albuminous substances, salts of sulphonated fatty acids and of aralkyl sulphonics acids, oil suspensions, etc. The hydrocarbon suspension is then polymerised in presence of oxygen, and with an accelerator such as sodium perborate, potassium percarbonate, or barium peroxide. In one example, a mixture of isoprene and dimethyl-butadiene is emulsified with egg albumen and soap in water, and polymerised in presence of oxygen.

283,841. The polymerisation of butadiene, dimethyl-butadiene and isoprene is effected by treating with sodium or potassium in an atmosphere of hydrogen, nitrogen, or carbon dioxide in presence of an organic hydroxy compound or ether of high molecular weight, such as starch, cellulose, cellulose ether, or superficially oxidised rubber. Several examples are given.

283,864. SULPHONATED COMPOUNDS. Oranienburger Chemische Fabrik Akt.-Ges., 23, Mühlenstrasse, Oranienburg Germany. (Assignees of Chemische Fabrik Milch Akt.-Ges., 67, Oranienburgerstrasse, Berlin.) International Convention date, January 17, 1927.

Sulpho acids are obtained by condensing acetic, propionic, butyric or lactic acid with naphthalene, anthracene and their derivatives formed by alkylation, chlorination, hydroxylation, hydrogenation, etc., by means of dehydrating and strongly sulphonating substances such as halogen-sulphonic acids. Thus, a mixture of anthracene and propionic acid may be treated with chlorosulphonic acid. The products are wetting, emulsifying and defatting agents.

283,868. CONTAINERS FOR ACIDS. H. O. Traun (trading as H. Traun und Söhne vorm. Harburger Gummikamm-Compagnie), 59, Meyerstrasse, Hamburg, Germany. International Convention date, January 18, 1927.

Containers for hydrofluoric acid are made from or covered with a phenol-formaldehyde condensation product.

283,869. CATALYTIC APPARATUS. Pétrole Synthétique Soc. Anon., 6, Rue d'Argenson, Paris. International Convention date, January 18, 1927.

Catalytic gaseous reactions are effected in a narrow annular space, a few millimetres in thickness. The catalyst may be a coating on the inner wall.

283,877. HALOGENATED ORGANIC COMPOUNDS. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. International Convention date, January 18, 1927.

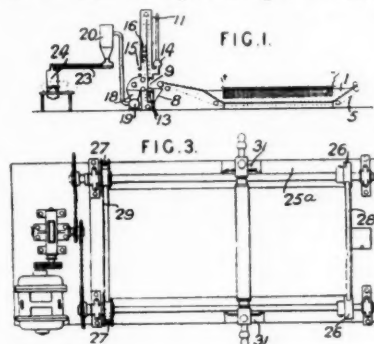
Organic compounds are halogenated and the mixture of products treated with methanol to effect a reaction between the alcohol and the hydrogen halide. The reaction may be effected at 100° C., or in gaseous phase at 150° to 300° C., in the presence of a catalyst such as a metal halide. Thus, a mixture of methyl chloride and chlorine is heated to 360° to 380° C., and the resulting mixture of methyl, methylene, and hydrogen chlorides treated with boiling methanol. The product is a mixture of methyl and methylene chlorides, and the methyl chloride is then treated again. Other examples are given.

283,897. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. International Convention date, January 19, 1927.

Soluble dyes are obtained by sulphonating the monoazo dyestuffs produced by coupling a diazotized *o*-nitroarylamine with an acetoacetic arylide or by coupling a diazotized *e*-nitroarylamine with a sulphonic acid of an acetoacetic arylide. Examples are given. The products give yellow shades fast to light.

283,898. RED LEAD. Consortium Electro-Chimique de France, 26, Quai Galupierie, Bayonne, Basses Pyrénées, France. (Assignees of J. J. Tardan, Villa Bichinche, Ciboure, Basses Pyrénées, France.) International Convention date, January 19, 1927.

Finely-divided lead, produced in an electrolytic vat 1, is carried by an endless belt 5 of rubber-treated cloth to a hopper 8 and is then fed by rolls 13 to a metallic cloth 9



283,898

passing through a drying chamber 11 heated by the passage of air over a resistance heater, up to 200° C. The dry lead powder passes to a pulveriser 19 and cyclone separator 20, and thence to a roasting furnace 24. The latter is electrically heated and is of the rocking and rotating type. The heat insulated chamber has a convex roller surface 29 and a flat roller surface 28 engaging with rollers 27, 26 driven by an electric motor which thus rotates the furnace chamber. The chamber is tilted on bearings 31 formed by sliding gudgeons which are withdrawn when the furnace is rotated. The red lead, which is produced in six to eight hours, needs no grinding.

283,908. MIXED FERTILISERS. F. G. Liljenroth, 14, Eriksbergsgatan, Stockholm. International Convention date, January 20, 1927. Addition to 282,330.

Calcium phosphate is treated with an acid whose calcium salt is soluble, and with a soluble sulphate, to obtain mixed fertilisers as described in specification 282,330 (see THE CHEMICAL AGE, Vol. XVIII, p. 150), but 15 to 20 per cent. less acid is used. Mono-calcium phosphate and phosphoric acid are obtained. The soluble sulphate is preferably ammonium sulphate.

283,913. LEAD TETRA-ALKYL. H. W. Dandl, 30½, Ziegler Tract, Carney's Point, N.J., U.S.A. International Convention date, January 20, 1927.

A suspension of lead chloride and magnesium turnings in dry ether is distilled with ethyl bromide under a reflux condenser for a prolonged period. The ether is distilled off at a low temperature, and then the lead tetra-ethyl is distilled off in steam.

283,964. ACID-PROOF LININGS. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. International Convention date, January 22, 1927.

Acid-proof linings for vessels involving heat transference are made of cast silicon.

### LATEST NOTIFICATIONS.

286,708. Contact sulphuric acid process. Selden Co. March 10, 1927.

286,685. Manufacture of benzanthrone derivatives. I.G. Farbenindustrie Akt.-Ges. March 9, 1927.

286,688. Process for the manufacture of new dihalogen acylated diphenylethers, and of highly active therapeutic substances therefrom. Schering-Kahlbaum Akt.-Ges. March 9, 1927.

- 286,669. Process for the manufacture of vat dyestuffs of the anthanthrone series. I.G. Farbenindustrie Akt.-Ges. March 8, 1927.
- 286,717. Process for the manufacture of substantive azo dyestuffs. I.G. Farbenindustrie Akt.-Ges. March 10, 1927.
- 286,694. Manufacture of 6-nitro-2-amino-1-benzoic acid and derivatives thereof. I.G. Farbenindustrie Akt.-Ges. March 9, 1927.
- 287,050. Manufacture of condensation products of the pyrene-quinone series. I.G. Farbenindustrie Akt.-Ges. March 12, 1927.
- 286,672. Comb for applying dyes and the like. Laguionie, J., and Marty, H. March 8, 1927.
- 286,678. Manufacture and production of valuable hydrocarbons or derivatives thereof from coal, tars, mineral oils, and the like. I.G. Farbenindustrie Akt.-Ges. September 10, 1925.
- 286,679. Manufacture and production of valuable hydrocarbons or derivatives thereof from coal, tars, mineral oils, and the like. I.G. Farbenindustrie Akt.-Ges. September 10, 1925.
- 286,680. Manufacture and production of valuable hydrocarbons or derivatives thereof from coal, tars, mineral oils, and the like. I.G. Farbenindustrie Akt.-Ges. September 10, 1925.
- 286,681. Manufacture and production of valuable hydrocarbons or derivatives thereof from coal, tars, mineral oils, and the like. I.G. Farbenindustrie Akt.-Ges. September 10, 1925.
- 286,730. Method of producing hexamethylenetetramine. Schieferwerke Ausdauer Akt.-Ges. March 10, 1927.
- 286,736. Process for producing photo-prints and photo-copies. I.G. Farbenindustrie Akt.-Ges. March 10, 1927.
- 287,072. Synthetic production of ammonia. Nitrogen Engineering Corporation. March 12, 1927.

#### Specifications Accepted with Date of Application

- 263,117. Sulphonating of fatty acids and their esters. H. T. Bohme Akt.-Ges. December 16, 1925. Addition to 261,385.
- 263,119, 263,120 and 265,550. Lithopone, Manufacture of. New Jersey Zinc Co. December 15, 1925, and February 2, 1926.
- 265,985. Solid diazo salts, Manufacture of. I.G. Farbenindustrie Akt.-Ges. February 12, 1926.
- 266,388. Diazo sulphamic acids of the cyclic series, Process of obtaining. I.G. Farbenindustrie Akt.-Ges. February 22, 1926.
- 268,749. Acetone and butyl alcohol, Production of—by fermentation. Commercial Solvents Corporation. April 3, 1926.
- 269,582. Diazo sulphamic acids of the cyclic series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. April 15, 1926. Addition to 266,388.
- 269,947. Molybdic and tungstic acid from ores, Production of. Metallwerk Plansee Ges. April 26, 1926.
- 272,923. Acetic anhydride, Manufacture of. Consortium für Elektrochemische Industrie Ges. June 16, 1926.
- 274,072. White titanium pigments and the products obtained therefrom, Preparation of. G. Carteret. July 12, 1926.
- 275,580. Utilisation of titanium materials containing iron, Process for. Titan Co., Aktieselskabet. August 3, 1926.
- 277,640. Aluminium or alloys of aluminium from alumina, Production of. Metallbank und Metallurgische Ges. Akt.-Ges. September 18, 1926.
- 279,429. Azo dyestuffs and their chromium compounds, Manufacture and production of. I.G. Farbenindustrie Akt.-Ges. October 22, 1926.
- 281,227. Para-hydroxy-ortho-benzoyl-benzoic acid, Process of preparing. Newport Co. November 29, 1926.
- 282,347. Dihydroxy acetone, Process for manufacture of. I.G. Farbenindustrie Akt.-Ges. December 18, 1926. Addition to 269,950.
- 286,323. Dyestuffs, Manufacture of. R. F. Thomson, J. Thomas, and Scottish Dyes, Ltd. September 24, 1926.
- 286,324. Semi-liquid materials into high-pressure vessels, Method of introducing. Synthetic Ammonia and Nitrated, Ltd., and H. A. Humphrey. September 27, 1926.
- 286,331-2. Carbohydrates derivatives, Manufacture of. W. Harrison. October 30, 1926.
- 286,358. Isatins of the naphthalene series, Manufacture of. K. Carpmal and K. S. Carpmal. (I.G. Farbenindustrie Akt.-Ges.) December 1, 1926.
- 286,456. High grade products from raw coal, Method of obtaining. Chemische Fabrik in Billwarder vorm. Hell and Sthamer Akt.-Ges. and F. L. Kuhlwein. March 5, 1927.
- 286,457. Electrolytic deposits of metals or alloys, Process for producing. L. Mellersh-Jackson. (Siemens and Halske Akt.-Ges.) March 8, 1927.
- 286,359. Indigoid dyestuffs, Manufacture of. K. Carpmal and K. S. Carpmal. (I.G. Farbenindustrie Akt.-Ges.) December 1, 1926.

#### Applications for Patents

- Appareils Evaporateurs Kestner. Production of nitrate of lime. 7,747. March 13. (France, May 6, 1927.)
- Australine Color Transformers Proprietary, Ltd., and Bloxam, A. G., Transforming dyed colours in fabrics, etc. 7,751. March 13.
- Bataafsche Petroleum Maatschappij. Production of butyl-compounds. 7,600. March 12. (Holland, October 1, 1927.)
- Boehringer, A., and Boehringer Sohn, C. H. Preparing tetrazoles. 8,111. March 16. (Germany, March 30, 1927.)
- Dreyfus, H. Manufacture of organic compounds. 8,056, 8,057. March 16.
- Du Pont de Nemours and Co., E. I. Manufacture of esters, etc. 7,633. March 12. (United States, March 26, 1927.)
- Hale, W. J. Producing organic acids. 7,605. March 12. (United States, March 12, 1927.)
- Hinchley, J. W. Bleaching molasses. 7,924. March 15.
- Horsley, G. F., and Imperial Chemical Industries, Ltd. Hydrogenation of unsaturated aldehydes. 7,908. March 15.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Recovery of unsaturated aliphatic hydrocarbons. 7,581. March 12.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Production of acetaldehyde from acetylene. 7,582. March 12.
- I.G. Farbenindustrie Akt.-Ges., and Imray, O. Y. Manufacture of azo-dyestuffs. 7,587. March 12.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of silica, etc. 8,081. March 16.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of nitrogenous vat dyestuffs. 8,082. March 16.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Recovery of organic acids. 8,083. March 16.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of condensation products of the benzanthrone series. 8,084. March 16.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Conversion of salts and fertilisers, etc., into globular, etc., shaped bodies. 8,085. March 16.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of acetone. 8,086. March 16.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of unsaturated hydrocarbons. 8,087. March 16.
- I.G. Farbenindustrie Akt.-Ges. Production of fertilisers. 7,580. March 12.
- I.G. Farbenindustrie Akt.-Ges. Manufacture of arsenic preparations. 7,721. March 13. (Germany, March 14, 1927.)
- I.G. Farbenindustrie Akt.-Ges. Manufacture of condensation products from urea, etc. 7,843. March 14. (Germany, March 14, 1927.)
- I.G. Farbenindustrie Akt.-Ges. Preparation of benzene soaps. 7,954. March 15. (Germany, November 9, 1925.)
- I.G. Farbenindustrie Akt.-Ges. Preparation of oil varnishes. 7,955. March 15. (Germany, November 9, 1925.)
- I.G. Farbenindustrie Akt.-Ges. Preparation of cellulose ester lacquers. 7,956. March 15. (Germany, November 9, 1925.)
- I.G. Farbenindustrie Akt.-Ges. Manufacture of substituted thioglycolic acids. 8,091. March 16. (Germany, March 18, 1927.)
- I.G. Farbenindustrie Akt.-Ges. Manufacture of condensation products of the benzodiazine series. 8,092. March 16. (Germany, March 18, 1927.)
- Nitrogen Engineering Corporation. Synthetic production of ammonia. 7,647. March 12. (United States, March 12, 1927.)
- Ormandy, W. R. Recovery of acetone from gases. 7,807. March 14.
- Plauson, H., and Patts, H. E. Emulsification, etc. 8,168. March 17.
- Silica Gel Corporation. Manufacture of absorbent silica, etc., gels. 7,622. March 12. (United States, March 12, 1927.)
- Takayama, Y. Separating betaine hydrochloride, etc., from waste molasses. 7,741. March 13.
- Woodcock, B. Distillation and decarbonisation of coal, etc. 7,658. March 13.

#### Chemical Fertilisers for Canadian Wheat Lands.

ACCORDING to Mr. W. J. Stephen, the Provincial Field Crop Commissioner of Alberta, widespread experiments to determine the effects of superphosphate fertilizers on the crops of Western Canada are to be carried out this spring. The Government of Alberta is co-operating with the experimental farms of the Dominion Department of Agriculture and with the Canadian Pacific Railway Co. in arrangements for experimental work to be carried out, not only at Government institutions but by individual farmers. Mr. Stephen states that at the Tadanac Smelter of the Consolidated Mining and Smelting Co. of Canada, Ltd., at Trail, B.C., a million tons of this fertilizer could be obtained annually at a nominal price. The superphosphate would be used to the extent of 50 lbs. per acre, which amount would cost 90 cents delivered.



## Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

### General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.  
 ACID BORIC, COMMERCIAL.—Crystal, £30 per ton; powder, £32 per ton; extra fine powder, £34 per ton.  
 ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity strength, and locality.  
 ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.  
 ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.  
 AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.  
 BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages extra.  
 BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.  
 BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £19 per ton; powder, £21 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)  
 CALCIUM CHLORIDE (Solid).—£5 to £5 5s. per ton d/d carr. paid.  
 COPPER SULPHATE.—£25 to £25 10s. per ton.  
 METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 11d. to 2s. 4d. per gall.; pyridinised industrial, 2s. 1d. to 2s. 6d. per gall.; mineralised, 3s. to 3s. 4d. per gall.; 64 O.P., 1d. extra in all cases; prices according to quantity as from March 1, 1928.  
 NICKEL SULPHATE.—£38 per ton d/d.  
 NICKEL AMMONIA SULPHATE.—£38 per ton d/d.  
 POTASH CAUSTIC.—£30 to £33 per ton.  
 POTASSIUM BICHROMATE.—4½d. per lb.  
 POTASSIUM CHLORATE.—3½d. per lb., ex wharf, London, in cwt. kegs.  
 SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.  
 SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.  
 SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.  
 SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.  
 SODIUM ACETATE 97/98%.—£21 per ton.  
 SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.  
 SODIUM BICHROMATE.—3½d. per lb.  
 SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.  
 SODIUM CHLORATE.—2½d. per lb.  
 SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.  
 SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.  
 SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.  
 SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.  
 SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.  
 SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

### Coal Tar Products

ACID CARBOLIC CRYSTALS.—6½d. to 7½d. per lb. Crude 60's, 2s. 3d. to 2s. 4d. per gall. prompt.  
 ACID CRESYLIC 99/100.—2s. 11d. to 3s. per gall. 97/99.—2s. 6d. to 2s. 10d. per gall. Pale, 95%, 2s. 5d. to 2s. 7½d. per gall. Dark, 95%, 2s. 2d. to 2s. 3d.  
 ANTHRACENE.—A quality, 2½d. per unit. 40%, £5 per ton.  
 ANTHRACENE OIL, STRAINED.—8d. to 8½d. per gall. Unstrained, 7½d. to 8d. per gall.  
 BENZOLE.—Prices at works; Crude, 8½d. to 9d. per gall.; Standard Motor, 1s. 1d. to 1s. 2d. per gall.; 90%, 1s. 2d. to 1s. 3d. per gall.; Pure, 1s. 5d. to 1s. 6d. per gall.  
 TOLUOLE.—90%, 1s. 4d. to 1s. 8d. per gall. Firm. Pure, 1s. 6d. to 1s. 10d. per gall.  
 XYLOL.—1s. 3d. to 1s. 7d. per gall. Pure, 2s. 4d. per gall.  
 CREOSOTE.—Cresylic, 20/24%, 10d. to 11d. per gall.; middle oil, 7½d. to 8½d. per gall. Heavy, 8½d. to 8¾d. per gall. Standard specification, 7½d. to 7¾d. ex works. Salty, 7½d. per gall.  
 NAPHTHA.—Crude, 7½d. to 8d. per gall. Solvent 90/160, 10d. to 10½d. per gall. Solvent 95/160, 1s. 3d. to 1s. 4d. per gall. Solvent 90/190, 9½d. to 1s. 2d. per gall.  
 NAPHTHALENE CRUDE.—Drained Creosote Salts, £5 per ton. Whizzed or hot pressed, £8 per ton.  
 NAPHTHALENE.—Crystals, £13 to £13 10s. per ton. Quiet. Flaked, £14 to £15 per ton, according to districts.  
 PITCH.—Medium soft, 60s. to 70s. per ton, f.o.b., according to district. Nominal.  
 PYRIDINE.—90/140, 5s. 6d. to 7s. per gall. 90/180, 3s. to 5s. per gall. Heavy, 2s. 6d. to 3s. per gall.

### Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:  
 ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.  
 ACID ANTHRANILIC.—6s. per lb. 100%.  
 ACID BENZOIC.—1s. 8½d. per lb.  
 ACID GAMMA.—4s. 6d. per lb.  
 ACID H.—3s. per lb.  
 ACID NAPHTHIONIC.—1s. 6d. per lb.  
 ACID NEVILLE AND WINTHER.—4s. 9d. per lb.  
 ACID SULPHANILIC.—8½d. per lb.  
 ANILINE OIL.—8d. per lb. naked at works.  
 ANILINE SALTS.—8d. per lb. naked at works.  
 BENZALDEHYDE.—2s. 3d. per lb.  
 BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.  
 BENZOIC ACID.—1s. 8½d. per lb.  
 o-CRESOL 29/31° C.—5½d. per lb.  
 m-CRESOL 98/100%.—2s. 3d. to 2s. 5d. per lb.  
 p-CRESOL 32/34° C.—2s. 3d. to 2s. 5d. per lb.  
 DICHLORANILINE.—2s. per lb.  
 DIMETHYLANILINE.—1s. 11d. per lb.  
 DINITROBENZENE.—8½d. per lb. naked at works. £75 per ton.  
 DINITROCHLOROBENZENE.—£84 per ton d/d.  
 DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.  
 DIPHENYLAMINE.—2s. 10d. per lb. d/d.  
 a-NAPHTHOL.—2s. per lb. d/d.  
 B-NAPHTHOL.—10d. per lb. d/d.  
 a-NAPHTHYLAMINE.—1s. 3d. per lb.  
 B-NAPHTHYLAMINE.—3s. per lb.  
 o-NITRANILINE.—5s. 9d. per lb.  
 m-NITRANILINE.—3s. per lb. d/d.  
 p-NITRANILINE.—1s. 8d. per lb.  
 NITROBENZENE.—6d. per lb. naked at works.  
 NITRONAPHTHALENE.—1s. 3d. per lb.  
 R. SALT.—2s. 2d. per lb.  
 SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.  
 o-TOLUIDINE.—8d. per lb.  
 p-TOLUIDINE.—2s. 1d. per lb. naked at works.  
 m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.  
 N. W. ACID.—4s. 9d. per lb. 100%.

### Wood Distillation Products

ACETATE OF LIME.—Brown, £10 5s. per ton. Good demand. Grey, £14 10s. to £15 per ton. Liquor, 9d. per gall.  
 CHARCOAL.—£6 to £9 per ton, according to grade and locality. Foreign competition severe.  
 IRON LIQUOR.—1s. 3d. per gall, 32° Tw. 1s. per gall, 24° Tw.  
 RED LIQUOR.—9d. to 10d. per gall.  
 WOOD CREOSOTE.—1s. 9d. per gall. Unrefined.  
 WOOD NAPHTHA, MISCIBLE.—3s. 11d. to 4s. 3d. per gall. Solvent, 4s. 3d. per gall.  
 WOOD TAR.—£4 to £5 per ton.  
 BROWN SUGAR OF LEAD.—£40 15s. per ton.

### Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 5½d. per lb., according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.  
 ARSENIC SULPHIDE, YELLOW.—1s. 9d. per lb.  
 BARYTES.—£3 10s. to £6 15s. per ton, according to quality.  
 CADMIUM SULPHIDE.—2s. 6d. to 2s. 9d. per lb.  
 CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.  
 CARBON BLACK.—5½d. per lb., ex wharf.  
 CARBON TETRACHLORIDE.—£45 to £50 per ton, according to quantity, drums extra.  
 CHROMIUM OXIDE, GREEN.—1s. 1d. per lb.  
 DIPHENYLGUANIDINE.—3s. 9d. per lb.  
 INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5½d. to 6½d. per lb.  
 LAMP BLACK.—£35 per ton, barrels free.  
 LEAD HYPOSULPHITE.—9d. per lb.  
 LITHOPHON, 30%.—£22 10s. per ton.  
 MINERAL RUBBER "RUBFRON".—£13 12s. 6d. per ton, f.o.r. London.  
 SULPHUR.—£9 to £11 per ton, according to quality.  
 SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.  
 SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.  
 THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.  
 THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.  
 VERMILION, PALE OR DEEP.—6s. to 6s. 3d. per lb.  
 ZINC SULPHIDE.—1s. per lb.

### Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£39 per ton ex wharf London in glass containers.  
 ACID, ACETYL SALICYLIC.—2s. 5d. to 2s. 7d. per lb.  
 ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz., according to quantity.

ACID, BORIC B.P.—Crystal, 36s. to 39s. per cwt.; powder, 40s. to 43s. per cwt.; extra fine powder, 42s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—2s. to 2s. 2d. per lb. Less 5%

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d. per lb.

ACID, SALICYLIC, B.P. PULV.—1s. 2d. to 1s. 3½d. per lb.; Technical.—11½d. to 11¾d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 4½d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—8s. to 8s. 3d. per lb.

AMMONIUM BENZOATE.—3s. to 3s. 3d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimed, 1s. per lb.

ATROPINE SULPHATE.—9s. per oz.

BARBITONE.—5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. 3d. per lb. spot.

BISMUTH CARBONATE.—11s. 4d. to 11s. 7d. per lb.

BISMUTH CITRATE.—10s. 4d. to 10s. 7d. per lb.

BISMUTH SALICYLATE.—10s. 7d. to 10s. 10d. per lb.

BISMUTH SUBNITRATE.—9s. 7d. to 9s. 10d. per lb.

BISMUTH NITRATE.—6s. 7d. to 6s. 10d. per lb.

BISMUTH OXIDE.—14s. 7d. to 14s. 10d. per lb.

BISMUTH SUBCHLORIDE.—14s. 4d. to 14s. 7d. per lb.

BISMUTH SUBGALLATE.—8s. 7d. to 8s. 10d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTH ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 1½d. per lb.; 12 W. Qts. 1s. 0½d. per lb.; 36 W. Qts., 1s. per lb.

BORAX B.P.—Crystal, 24s. to 27s. per cwt.; powder, 25s. to 28s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.

BROMIDES.—Ammonium, 2s. to 2s. 1d. per lb.; potassium, 1s. 8½d. to 1s. 9½d. per lb.; sodium, 1s. 11d. to 2s. per lb.; granulated, ½d. per lb. less; all spot. Large quantities at lower rates.

CALCIUM LACTATE.—1s. 1½d. to 1s. 3d. per lb.

CAMPHOR.—Refined flowers, 2s. 11d. to 3s. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 2d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. 730—1s. 0½d. to 1s. 1½d. per lb., according to quantity; other gravities at proportionate prices.

FORMALDEHYDE.—£39 per ton, in barrels ex wharf.

GUAIACOL CARBONATE.—4s. 9d. to 5s. per lb.

HEXAMINE.—2s. 3d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

IRON AMMONIUM CITRATE.—B.P., 2s. 5d. to 2s. 8d. per lb. Green, 2s. 8d. to 3s. 1d. per lb.; U.S.P., 2s. 6d. to 2s. 9d. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb., in 1 cwt. lots.

MENTHOL.—A.B.R. recrystallised B.P., 17s. 1½d. per lb. net for January delivery; Synthetic, 9s. to 10s. per lb.; Synthetic detached crystals, 9s. to 12s. 6d. per lb., according to quantity; Liquid (95%), 9s. 6d. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, 7s. 6d. to 7s. 7d. per lb., levig., 7s. to 7s. 1d. per lb.; Corrosive Sublimate, Lump, 5s. 9d. to 5s. 10d. per lb.; Powder, 5s. 2d. to 5s. 3d. per lb.; White Precipitate, Lump, 5s. 11d. to 6s. per lb.; Powder, 6s. to 6s. 1d. per lb.; Extra Fine, 6s. 1d. to 6s. 2d. per lb.; Calomel, 6s. 4d. to 6s. 5d. per lb.; Yellow Oxide, 6s. 10d. to 6s. 11d. per lb.; Persulph., B.P.C., 6s. 1d. to 6s. 2d. per lb.; Sulph. nig., 5s. 10s. to 5s. 11d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 5d. to 1s. 9d. per lb.

METHYL SULPHONAL.—9s. to 9s. 3d. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 1d. to 1s. 4d. per lb.

PHENACETIN.—2s. 6d. to 2s. 9d. per lb.

PHENAZONE.—4s. to 4s. 3d. per lb.

PHENOLPHTHALEIN.—6s. to 6s. 3d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—102s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 5d. to 2s. 6d. per lb.; U.S.P., 2s. 3d. to 2s. 6d. per lb.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included, f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—55s. per lb.; in quantity lower.

SALOL.—2s. 4d. per lb.

SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.

SODIUM CITRATE, B.P.C., 1911.—2s. to 2s. 3d. per lb., B.P.C., 1923.—2s. 4d. to 2s. 5d. per lb. U.S.P., 2s. 3d. to 2s. 6d. per lb., according to quantity.

SODIUM FERROCYANIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—90s. to 95s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 1s. 7½d. to 1s. 9d. per lb. Crystal, 1s. 8d. to 1s. 10d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £28 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—6s. 9d. to 7s. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb.

THYMOL.—Puriss., 9s. 6d. to 9s. 9d. per lb., according to quantity. Firmer. Natural, 14s. 3d. per lb.

### Perfumery Chemicals

ACETOPHENONE.—7s. per lb.

AUBEPINE (EX ANETHOL).—11s. per lb.

AMYL ACETATE.—2s. per lb.

AMYL BUTYRATE.—4s. 9d. per lb.

AMYL SALICYLATE.—2s. 9d. per lb.

ANETHOL (M.P. 21/22° C.).—5s. 6d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL BENZOATE.—2s. 9d. per lb.

CINNAMIC ALDEHYDE NATURAL.—15s. 6d. per lb.

COUMARIN.—10s. per lb.

CITRONELLOL.—13s. 6d. per lb.

CITRAL.—8s. 3d. per lb.

ETHYL CINNAMATE.—6s. per lb.

ETHYL PHTHALATE.—3s. per lb.

EUGENOL.—8s. 3d. per lb.

GERANIOL (PALMAROSA).—20s. per lb.

GERANIOL.—6s. to 10s. per lb.

HELIOTROPINE.—4s. 6d. per lb.

ISO EUGENOL.—13s. per lb.

LINALOL.—Ex Bois de Rose, 15s. per lb. Ex Shui Oil, 10s. 6d. per lb.

LINALYL ACETATE.—Ex Bois de Rose, 8s. 6d. per lb. Ex Shui Oil, 14s. 6d. per lb.

METHYL ANTHRANILATE.—8s. 6d. per lb.

METHYL BENZOATE.—4s. per lb.

MUSK KETONE.—35s. per lb.

MUSK XYLOL.—7s. per lb.

NEROLIN.—4s. 6d. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—10s. 6d. per lb.

RHODINOL.—35s. per lb.

SAFROL.—1s. 6d. per lb.

TERPINEOL.—1s. 8d. per lb.

VANILLIN.—15s. 3d. to 16s. 6d. per lb.

### Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. 6d. per lb.

ANISE OIL.—2s. 9d. per lb.

BERGAMOT OIL.—22s. 6d. per lb.

BOURBON GERANIUM OIL.—15s. per lb.

CAMPHOR OIL.—9d. per lb.

CANANGA OIL, JAVA.—12s. 9d. per lb.

CINNAMON OIL LEAF.—6s. 9d. per lb.

CASSIA OIL, 80/85%.—8s. 3d. per lb.

CITRONELLA OIL.—Java, 1s. 10d. per lb., c.i.f. U.K. port. Ceylon, pure, 1s. 9d. per lb.

CLOVE OIL.—5s. 6d. per lb.

EUCALYPTUS OIL, AUSTRALIAN.—2s. 1d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, Esters, 15s. 6d. per lb.

LEMON OIL.—9s. 6d. per lb.

LEMONGRASS OIL.—4s. 3d. per lb.

ORANGE OIL, SWEET.—13s. per lb.

OTTO OF ROSE OIL.—Anatolian, 35s. per oz. Bulgarian, 62s. 6d. per oz.

PALMA ROSA OIL.—12s. 6d. per lb.

PEPPERMINT OIL.—Wayne County, 15s. 9d. per lb.; Japanese, 7s. 3d. per lb.

PETITGRAIN.—7s. 3d. per lb. Sandalwood, Mysore, 26s. 6d. per lb., 90/95%, 16s. 6d. per lb.

## London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, March 22, 1928.

BUSINESS has been fairly brisk during the current week and prices are generally without change. Export trade is fair.

### General Chemicals

ACETONE has advanced in price and is steady at £65 to £67 per ton.  
ACID ACETIC.—Unchanged at £37 to £38 per ton for 80% grades.  
ACID CITRIC is nominal at 2s. per lb., less 5%.  
ACID FORMIC.—Demand remains about the same, and price is £47 per ton for 85%.  
ACID LACTIC.—Unchanged.  
ACID OXALIC is still exceedingly firm, and in good demand at £30 10s. per ton.  
ACID TARTARIC.—The position is still very firm, and price unchanged at 1s. 4½d. to 1s. 5d. per lb. Demand is improving.  
ALUMINA SULPHATE.—There is still a fair inquiry, and price is firm at £5 15s. to £5 17s. 6d. per ton for 17-18%.  
AMMONIUM CHLORIDE.—Unchanged.  
ARSENIC.—Unchanged.  
BARIUM CHLORIDE.—Unchanged at £8 8s. per ton.  
COPPER SULPHATE.—Unchanged.  
CREAM OF TARTAR.—Supplies are still short. There is a fair demand, and price remains about £100 per ton for B.P. grade. The forward position is very firm.  
EPSOM SALTS.—Unchanged.  
FORMALDEHYDE.—Demand is fair at £39 per ton.  
LEAD ACETATE.—The good demand continues. Price unchanged at £42 per ton for white, with £1 per ton less for brown.  
LIME ACETATE.—Unchanged.  
METHYL ACETONE is still in fair request at £55 per ton for 40/45%.  
POTASSIUM CARBONATE AND CAUSTIC.—Unchanged.  
POTASSIUM CHLORATE.—Demand continues good at £29 to £30 per ton.  
POTASSIUM PERMANGANATE remains steady and in good demand at 5½d. per lb.  
POTASSIUM PRUSSATE remains unchanged at £59 to £63 per ton, according to quantity.

SODA ACETATE.—Supplies are even shorter, and price remains firm at about £22 per ton.  
SODA BICHROMATE.—Unchanged.  
SODA CHLORATE.—There is little demand, and price is unchanged at £28 to £30 per ton.  
SODA HYPOSULPHITE.—Unchanged.  
SODA NITRITE is very firm at £20 per ton, with fair demand.  
SODA PHOSPHATE.—Unchanged.  
SODA PRUSSATE.—Unchanged at 4½d. per lb.  
SODA SULPHIDE.—Unchanged.  
TARTAR EMETIC continues firm at 11½d. to 11¾d. per lb.  
ZINC SULPHATE.—Unchanged.

### Coal Tar Products

The market for coal tar products remains quiet, with little change to report in prices, although there is a fair amount of inquiry.  
90% BENZOL is unchanged, at about 1s. 3d. to 1s. 4d. per gallon, while the motor quality is quoted at 1s. 1d. to 1s. 2d. per gallon.  
PURE BENZOL is worth about 1s. 5½d. to 1s. 6½d. per gallon, on rails.  
CREOSOTE OIL.—The market is still quiet, and prices remain at about 7½d. per gallon on rails in the North, and 8d. per gallon in London, although spot parcels can be bought at slightly under these figures. The forward position still remains fairly firm.  
CRESYLIC ACID is weaker, the 98/100% pale quality being quoted at 2s. 7d. per gallon at works, naked, and the dark quality 95/97% at 2s. per gallon.  
SOLVENT NAPHTHA remains very weak, and can be bought at about 8d. per gallon on rails in the provinces.  
HEAVY NAPHTHA is in better demand, and quantities have been bought at 8½d. to 9d. per gallon, naked, at maker's works.  
NAPHTHALENES are unchanged, the 74/76 quality being quoted at about £7 per ton, while the 76/78 quality is quoted at £8 to £8 10s. per ton, but these prices are not readily realised.  
PITCH.—There is a little more demand for shipments to be effected before the end of the season and supplies are none too abundant. The price remains unchanged at 60s. to 65s. per ton, f.o.b. U.K.

### Latest Oil Prices

LONDON, March 21.—LINSEED OIL steady, with quotations 5s. to 7s. 6d. per ton lower. Spot, ex mill, £29; March, £28; April, £28 5s.; May-August, £29 5s.; September-December, £30 5s.  
RAPE OIL slow and 10s. per ton lower. Crude extracted, £41 10s.; technical refined, £43 10s., naked, ex wharf. COTTON OIL quiet, Refined common edible, £40; Egyptian crude, £35; and deodorised, £42 per ton, naked. TURPENTINE slow at 3d. per cwt. decline. American, spot, 40s. 3d.; April, 40s. 6d.; May-June, 40s. 9d.; and July-December, 41s. 3d. per cwt.

HULL, March 21.—LINSEED OIL.—Spot and March, £29; April, £29 5s.; May-August, £29 10s.; September-December, £30 10s. per ton, naked. COTTON OIL.—Bombay crude, £32 10s.; Egyptian crude (new), £34 5s.; edible refined, £38; technical, £36; deodorised, £40 per ton. PALM KERNEL OIL.—Crushed, 5½ per cent., £38 per ton, naked. GROUNDNUT OIL.—Crushed-extracted, £42; deodorised, £46. SOYA OIL.—Extracted and crushed, £32 10s.; deodorised, £36. RAPE OIL.—Crude-extracted, £40; refined, £42 per ton. TURPENTINE, CASTOR OIL and COD OIL unaltered.

### Nitrogen Products

Export.—The market for sulphate of ammonia remains firm at £10 to £10 2s. 6d. per ton f.o.b. U.K. port in single bags. British colonies have continued buying, and the demand from continental countries and the Far East is unabated. There is still very little interest in forward positions.

Home.—Merchants in various parts of the country report continued buying for immediate consumption. Many farmers have left their orders till the last minute, and producers are making every effort to meet their requirements.

Nitrate of Soda.—The consumption of nitrate continues satisfactory and stocks in the large consuming countries are being reduced. However, there is still very little demand from Chile and the price remains steady at 16s. 6d. to 16s. 9d. per metric quintal, f.a.s.

### South Wales By-Products

BUSINESS in South Wales by-products is on a slightly better scale. The demand for pitch continues to expand, with prices unchanged at from 62s. 6d. to 67s. 6d. per ton. Solvent and heavy naphtha

continue to have a moderate demand. Crude tar is in steady demand round about 50s. to 60s. per ton f.o.r., while refined tars have a steady, if moderate, call, with prices unchanged. Patent fuel and coke exports are on a moderate scale. Patent fuel, from Cardiff, remains at from 21s. to 23s. per ton, while 21s. to 21s. 6d. is obtained at Swansea. Coke (best foundry) ranges from 32s. 6d. to 37s. per ton, other sorts from 25s. to 32s. 6d. per ton. Patent fuel exports from all South Wales ports during the four weeks ending March 13 amounted to 71,082 tons, while oil imports over the same period amounted to 19,027,919 gallons.

### Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHEMICALS, ETC., FOR THE WOOLLEN, TEXTILE AND LEATHER INDUSTRIES.—An agent in Bialystok, a centre of the woollen industry in Poland, desires to obtain the representation of British exporters of wool, raw hides, tanning extracts, chemicals and other raw materials used in the woollen, textile, and leather industries. (Reference No. 262.)

PHOTOSTAT PAPER AND CHEMICALS.—The Ministry of Finance, Egypt, are calling for tenders to be presented by June 4 for the supply and delivery of photostat paper and chemicals. (Reference B.X. 4289.)

PAINT, VARNISH, COLOURS, ETC.—A well-established firm of commission agents in Karachi wish to obtain British agencies. (Reference No. 237.)

### Dr. Hauser's New Appointment

DR. ERNST A. HAUSER, director of the colloid chemistry laboratory of the Metallbank und Metallurgischen Gesellschaft of Frankfurt, has been appointed "Non-Resident Associate Professor of Colloid Chemistry" in the Massachusetts Institute of Technology. During the coming summer term he will lecture at the Institute on applied colloid chemistry.



## Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, March 21, 1928.

BUSINESS in the heavy chemical market continues fairly satisfactory, and there are no changes in prices of any importance to record.

### Industrial Chemicals

- ACETONE, B.G.S.—£63 to £66 per ton, ex store, according to quantity.
- ACID ACETIC.—98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £37 10s. per ton, ex wharf; 80% technical £37 10s. per ton, ex wharf.
- ACID BORIC.—Crystals, granulated or small flakes, £30 per ton. Powdered, £32 per ton, packed in bags, carriage paid U.K. stations.
- ACID CARBOLIC, ICE CRYSTALS.—Quoted 6½d. per lb., f.o.b. U.K. ports.
- ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.
- ACID NITRIC.—80° quality, £24 10s. per ton, ex station, full truck loads.
- ACID OXALIC, 98/100%.—On offer from the continent at 3½d. per lb., ex wharf. Spot material quoted 3½d. per lb., ex store. In better demand.
- ACID SULPHURIC.—£2 15s. per ton, ex works, for 144° quality; £5 15s. per ton for 168° quality; dearsenicated quality, 20s. per ton extra.
- ACID TARTARIC, B.P. CRYSTALS.—Now quoted 1s. 4½d. per lb., less 5%, ex wharf. Demand rather easier.
- ALUMINA SULPHATE, 17/18%, IRON FREE.—Spot material on offer at £5 15s. per ton, ex store. Quoted £5 5s. per ton, c.i.f. U.K. ports, prompt shipment.
- ALUM, LUMP POTASH.—Spot material available at about £9 per ton, ex store. Crystal meal quoted £8 10s. per ton, ex store. Lump quality on offer from the continent at £8 5s. per ton, c.i.f. U.K. ports.
- AMMONIA, ANHYDROUS.—Unchanged at about 9d. per lb., carriage paid. Containers extra and returnable.
- AMMONIA CARBONATE.—Lump £37 per ton; powdered £39 per ton, packed in 5 cwt. casks delivered, or f.o.b. U.K. ports.
- AMMONIA LIQUID, 88°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.
- AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture unchanged at £23 to £24 per ton, ex station. Continental on offer at £19 15s. per ton, c.i.f. U.K. ports. Fine white crystals quoted £17 10s. per ton, c.i.f. U.K. ports.
- ARSENIC, WHITE POWDERED.—Quoted £19 7s. 6d. per ton, ex wharf, prompt despatch from mines. Spot material available at £20 5s. per ton, ex store.
- BARIUM CARBONATE, 98/100%.—English material on offer at £7 5s. per ton, ex store. Continental quoted £7 per ton, c.i.f. U.K. ports.
- BARIUM CHLORIDE, 98/100%.—Large white crystals quoted £6 17s. 6d. per ton, c.i.f. U.K. ports.
- BLEACHING POWDER.—British manufacturers' contract price to consumers £6 12s. 6d. per ton, delivered, minimum four-ton lots. Continental on offer at £6 10s. per ton, ex wharf.
- CALCIUM CHLORIDE.—British manufacturers' price £4 15s. per ton to £5 5s. per ton, ex station, according to quantity and point of delivery. Continental material quoted £3 12s. 6d. per ton, c.i.f. U.K. ports.
- COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports, for export.
- COPPER SULPHATE.—Continental price unchanged at about £25 per ton, c.i.f. U.K. ports. Some British material available at about £25 per ton, ex store.
- FORMALDEHYDE, 40%.—Offered at £35 10s. per ton, c.i.f. U.K. ports. Spot material quoted £39 per ton, ex store.
- GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental quoted £2 15s. per ton, c.i.f. U.K. ports.
- LEAD, RED.—Imported material on offer at £31 per ton, ex store.
- LEAD, WHITE.—Quoted £31 10s. per ton, ex store.
- LEAD, ACETATE.—White crystals quoted £39 15s. per ton, c.i.f. U.K. ports; brown, £38 10s. per ton, c.i.f. U.K. port. Spot material on offer at £42 15s. per ton, ex store, spot delivery.
- MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store, in moderate demand.
- METHYLATED SPIRIT.—Industrial quality 64 O.P., now quoted 2s. per gallon, delivered.
- POTASSIUM BICHROMATE.—4½d. per lb., delivered, minimum four-ton lots. Under four-ton lots 4d. per lb. extra.
- POTASSIUM CARBONATE, 96/98%.—Rather scarce for immediate delivery. Quoted £25 10s. per ton, ex wharf. Spot material about £26s. 10d. per ton, ex store.
- POTASSIUM CHLORATE, 99/100%.—Powdered material offered from the continent at £25 10s. per ton, c.i.f. U.K. ports. Crystals 30s. per ton more.
- POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.
- POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5½d. per lb., ex wharf.
- POTASSIUM PRUSSIAN (YELLOW).—Unchanged at about 6½d. per lb., ex store, spot delivery. Offered from the continent at 6½d. per lb.
- SODA CAUSTIC.—Powdered, 98/99%, £17 17s. 6d. per ton; solid, 76/77%, £14 10s. per ton; 70/72%, £13 12s. 6d. per ton, minimum 4-ton lots, carriage paid on contract. Spot material 10s. per ton extra.
- SODIUM ACETATE.—In good demand, and spot material scarce. Quoted £20 5s. per ton, ex store.
- SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.
- SODIUM BICHROMATE.—Quoted 3d. per lb., delivered buyer's works, minimum 4-ton lots. Under 4 and over 2-ton lots, 3½d. per lb. Under 2-ton lots, 3½d. per lb.
- SODIUM CARBONATE (SODA CRYSTALS).—£3 to £5 5s. per ton, ex quay or station. Powdered or pea quality, 27s. 6d. per ton extra.
- SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots.
- SODIUM NITRATE.—Quoted £11 per ton, ex store.
- SODIUM NITRITE, 100%.—Quoted £19 10s. per ton, ex store.
- SODIUM PRUSSIAN (YELLOW).—In moderate demand and price unchanged at about 4½d. per lb., ex store. Offered for prompt shipment from the Continent at 4½d. per lb., ex wharf.
- SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, for unground quality, 52s. 6d. per ton, delivered. Ground quality 2s. 6d. per ton extra.
- SODIUM SULPHIDE.—Prices now as follows:—Solid, 60/62%, £9 per ton; broken, 60/62%, £10 per ton; crystals, 30/32%, £9 2s. 6d. per ton, delivered buyer's works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.
- SULPHUR.—Flowers, £12 per ton; roll, £10 15s. per ton; rock, £10 12s. 6d. per ton; floristella, £9 10s. per ton; ground American, £9 5s. per ton, ex store. Prices nominal.
- ZINC CHLORIDE.—British material, 98/100%, quoted £24 15s. per ton, f.o.b. U.K. ports; 98/100% solid on offer from the Continent at about £21 15s. per ton, c.i.f. U.K. ports. Powdered 20s. per ton extra.
- ZINC SULPHATE.—Continental material quoted £11 15s. per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

### Du Pont Co. and Synthetic Ammonia Processes

THE reported failure of several firms producing synthetic ammonia in the United States is somewhat misleading in its significance, states the *Manchester Guardian Commercial*. The filing of voluntary petitions in bankruptcy by the firms is the sequel to the purchase by the Du Pont interests of the American rights of the Casale process previously worked by these firms. Though it is difficult to foretell the exact future of the plants, they will probably continue working. The move on the part of the Du Pont Company is made in order to avoid connection with subsidiary organisations. The firms in question are the Niagara Ammonia Co., which owns a plant at Niagara Falls, and the Ammonia Corporation, its principal creditor. Lazote Inc., of Wilmington, Del. (a Du Pont subsidiary), is the chief creditor of the Ammonia Corporation. The Du Pont firm already own the American rights of the Claude process.

## Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, March 22, 1928.

WHILST a relatively limited volume of business is being put through in chemical products on the spot market here rather more inquiry is about at the moment and indications are that a somewhat bigger demand will be experienced before long. On contract account deliveries of many of the bread-and-butter products continue on a satisfactory scale, although the demand from the textile and allied industries leaves much to be desired. Inquiry during the week for chemicals for shipment has been inactive and actual transactions have been of minor importance.

### Heavy Chemicals

Buying interest in the case of sulphide of sodium is quiet, and although values are fairly steady here and there, occasional cheap offers are reported; current value for the 60-65 per cent. concentrated solid quality is at £9 10s. to £10 per ton, with the commercial product quoted at round £7 15s. The demand for bicarbonate of soda is on a steady scale and makers' offers of this material are fully maintained at about £10 10s. per ton. Nitrite of soda shows little indication of easing off and up to £19 5s. per ton is currently asked, inquiry in this section being fairly active. With regard to chlorate of soda there is not much business passing in this just now, and offers are down to about 2½d. per lb. A continued good business is being done in the case of caustic soda, quotations for which by makers in contract lots are firm at from £13 7s. 6d. to £15 7s. 6d. per ton, according to quality. Alkali, also, is well held at £6 2s. 6d. to home users, and a fair trade is reported. There is not much movement in the case of hyposulphite of soda, but values show little change on the week, the photographic grade selling at about £16 10s. per ton and the commercial material at £9 5s. Bleaching powder is on offer on a contract basis of £7 per ton, and a moderate amount of buying interest in this continues to be shown. Saltcake is in quiet demand at about £2 12s. 6d. per ton. Prussiate of soda remains steady at 4½d. per lb., but sales have not been particularly brisk. In the case of bichromate of soda quotations are maintained at about 3½d. per lb., and a quietly steady business has been done. Phosphate of soda is quiet but steady at £12 5s. per ton.

Potassium permanganate of potash comes in for comparatively little attention just now, but there has been practically no change in the price position, B.P. quality selling at 5½d. per lb. and commercial at 4½d. A quiet trade is being put through in the case of yellow prussiate of potash, quotations for which are still in the neighbourhood of 6½d. per lb. Caustic potash is moving off in fairly satisfactory quantities, current offers being on the basis of £33 5s. per ton for prompt delivery of 1 to 5 ton lots. Carbonate of potash meets with some inquiry and is quoted this week at from £25 5s. to £25 10s. per ton. Chlorate of potash is fairly steady at about 3½d. per lb., although there is no great weight of business being done at the moment. Bichromate of potash is on offer at 4½d. to 4½d. per lb., and a moderate demand has been reported.

Arsenic values have not moved much from their recent levels and about £17 5s. per ton at the mines for white powdered, Cornish makes has been quoted here during the past week, without, however, attracting very much attention from buyers. Sulphate of copper is in fairly steady demand for home use and for shipment, with export values firm at £26 15s. to £27 per ton, f.o.b. A moderate business is passing in acetate of lime, with grey on offer at about £16 per ton, and brown material at £10 10s. Acetate of lead is in limited request and prices are on the easy side, white being quoted at £40 to £40 10s. per ton and brown at £38 10s. Nitrate of lead is quiet, but about unchanged, so far as prices are concerned, at round £37 per ton.

### Acids and Tar Products

Neither tartaric nor citric acid shows much sign of easing off, although there has been little further advance compared with a week ago, tartaric being quoted at 1s. 4½d. per lb. and citric at 1s. 11d. to 1s. 11½d. Oxalic acid is attracting a moderate amount of attention and prices are firm at 3½d. to 3½d. per lb. Acetic acid remains a fairly active section and

offers keep up, glacial selling at about £66 per ton and 80 per cent. commercial at £37 10s.

The undertone in the case of pitch seems to be rather stronger than of late, with values at £3 to £3 2s. 6d. per ton, f.o.b., though the demand for this shows little improvement. Creosote oil is moving off in moderate quantities at about 7½d. per gallon. Solvent naphtha is currently quoted at 10½d. to 10¾d. per gallon, and is in quiet demand. Crude carbolic acid is fairly active at about 2s. 3½d. per gallon, but crystals are slow at 6½d. per lb.

## The Artificial Silk Exhibition

### Points of Chemical Interest

AT the Artificial Silk Exhibition held this week at the Holland Park Hall, London, there were a number of exhibits of chemical interest. The use of dyestuffs and chemicals in the manufacture of artificial silk was illustrated by an interesting exhibit arranged by Imperial Chemical Industries, Ltd., whose products include B.D.C. dyestuffs, and chemicals such as acetic acid, ammonia, ammonium sulphate, calcium chloride, carbon disulphide, caustic soda, ether, hydrated lime, hydrochloric acid, liquid chlorine, lime, soda ash, sodium hypochlorite, sodium sulphide, sodium sulphate, sulphur dichloride, sulphuric acid, and sulphuryl chloride, all of which are used in the production of artificial silk.

The British Dyestuffs Corporation, Ltd., now part of I.C.I., has always kept well to the fore in the field of dyestuffs for use in connection with artificial silk. Duralon colours for the dyeing of cellulose acetate silks are in extensive use, and for obtaining level shades on irregular qualities of viscose Icy colours are very successful. In addition to these special ranges of colours there is also a wide selection of direct, acid, basic, sulphur and vat colours. The stand itself chiefly comprised a display of fabrics illustrative of the application of B.D.C. dyestuffs.

British Celanese, Ltd., exhibited a number of fabrics, etc., made of Celanese. The Western Viscose Silk Mills, Ltd., exhibited a complete set of samples illustrating the various stages in the manufacture of Wescosyl yarn, starting with crude woodpulp and finishing with the yarn in hanks. The mills of the company at Bristol are producing 27,500 lb. of Wescosyl per week, and when the existing buildings are fully equipped the output will be 100,000 lb. per week, employing 2,000 people. British Visada, Ltd., another company producing artificial silk, also exhibited, the display consisting of specimens showing different stages in the production of viscose yarn, as well as fabrics. Dyed and printed yarns and fabrics, as well as finished articles, were shown by the British Cotton and Wool Dyers' Association, Ltd., the Bradford Dyers' Association, Ltd., the Calico Printers' Association, Ltd., and the Bleachers' Association, Ltd.

### Oil and Colour Chemists' Annual Dinner

THE tenth annual dinner of the Oil and Colour Chemists' Association will be held at the Hotel Cecil, Strand, London, on Wednesday, April 18, at 7 for 7.30 p.m. The following are among those who have accepted the invitation of the president and council to attend: Sir Gerald Bellhouse, H.M. Inspector of Factories; Mr. E. R. Bolton, vice-president of the Institute of Chemistry; Sir Alexander Gibb, president of the Institution of Chemical Engineers; Professor G. T. Morgan, F.R.S., superintendent of the Chemical Research Laboratory, Teddington; Sir Robert Robertson, F.R.S., Government Chemist; Mr. S. K. Thornley, chairman of the Research Association of British Paint, Colour and Varnish Manufacturers; Mr. H. T. Tizard, F.R.S., secretary of the Department of Scientific and Industrial Research. The price of tickets is 12s. 6d., exclusive of wines. The secretary of the Association also announces that an invitation has been extended to members by the Deputy Keeper of Westminster Hall, to visit the Houses of Parliament and the Chapter House at Westminster, in order to inspect the frescos, new wall paintings, etc. The party will be limited to 50 members, who will meet at 2.15 p.m. at St. Stephen's entrance, on Saturday, March 31, 1928. Owing to the limitation of numbers, it will be necessary to take the applications in the order in which they are received.

## Company News

**ASBESTOS COMPANY OF CANADA.**—A dividend of  $1\frac{1}{2}$  per cent. is announced on the preferred stock.

**INTERNATIONAL NICKEL CO.**—The net profits for 1927 were 6,064,544 dols., and dividends amounting to 2 dol. per share were paid on the common stock.

**FOLLOWS AND BATE.**—The accounts for the past year show that the surplus of £757 brought forward was reduced to £36 after providing for interest and other charges.

**THARSIS SULPHUR AND COPPER.**—A dividend of  $8\frac{1}{2}$  per cent. less tax, is announced for the year 1927, and £85,109 is carried forward, after writing off £16,032, against £99,522 brought in.

**BRITISH CELANESE, LTD.**—At a meeting held on March 16 the directors declared a half-year's dividend on the £4,250,000  $7\frac{1}{2}$  per cent. cumulative preference shares, payable on April 30, 1928.

**IDRIS HYDRAULIC TIN.**—An interim dividend of 10 per cent., less income tax at 4s. in the £, has been declared in respect of the year ending December 31, 1928, payable on April 30.

**BRITISH OIL AND CAKE MILLS.**—A final dividend on the preferred ordinary shares of  $7\frac{1}{2}$  per cent. has been declared, making  $12\frac{1}{2}$  per cent. for the year 1927, against 10 per cent. for the previous year.

**BRITISH DRUG HOUSES, LTD.**—The directors have decided to recommend a dividend of 6 per cent., less tax, on the ordinary shares for the past year. For 1926 there was no dividend on the ordinary shares.

**TARMAC, LTD.**—Subject to the completion of the audit, the directors have decided to recommend in their annual report a final dividend of  $2\frac{1}{2}$  per cent., subject to income tax, on the ordinary shares, making, with the interim dividend paid on August 9, 1927,  $4\frac{1}{2}$  per cent. for the year.

**RIO TINTO CO.**—The directors have resolved to recommend at the general meeting to be held on April 4, a final dividend for the year 1927, on the ordinary shares, of 30s. per share, less income tax, subject, of course, to final audit, and after providing for the payment of the half-year's dividend on the 5 per cent. preference shares at the rate of 2s. 6d. per share, less income tax.

**GRAPHITE OILS.**—For the year ended December 31 last, the report states that after making allowance for depreciation, writing off final £300 from office and works (Grimsby) account, also allowing for income tax, there remains a net profit of £4,842, which, with £1,095 brought forward, provides a divisible profit of £5,937. The directors propose to pay a dividend of  $2\frac{1}{2}$  per cent., less tax, leaving to be carried forward £1,403.

**UNITED MOLASSES CO.**—The profit of the company and its subsidiaries for 1927 amounted to £386,102. From this has been deducted £119,853 for depreciation, leaving £266,249, while £19,884 was brought forward. A final dividend of 9 per cent. is proposed on the ordinary shares, making 17 per cent. for the year, adding to the reserve £62,000, and to superannuation fund £2,500, and carrying forward £20,255. It is stated that a bonus of one fully paid ordinary share is to be issued to ordinary shareholders for every 50 shares now held.

**ENGLISH MARGARINE WORKS.**—A net profit of £103,963 is reported for the year ended December 31, 1927, as compared with £119,093 for 1926. The credit balance brought forward from the last accounts was £34,577, making an available balance of £138,540. There has been reserved for depreciation on buildings and plant £20,280, written off motors and motor wagons £2,472, and placed to reserve for income tax £25,000, leaving £90,787. The directors recommend a dividend for the twelve months on the ordinary shares at 6 per cent., less income tax, carrying forward £36,037.

**DOMINION TAR AND CHEMICAL CO.**—The report for the year ended December 31, 1927, states that the net profit available, after having made ample provision for depreciation of various works, plant and rolling stock, is £99,813. The directors propose to pay a final dividend of  $6\frac{1}{2}$  per cent., subject to tax, on the ordinary shares, making a total for the year of 12 per cent., subject to British income tax, less Dominion relief, and payment of a bonus of  $2\frac{1}{2}$  per cent., subject to tax on the

ordinary shares, placing £35,000 to general reserve account, and carrying forward £10,703.

**HADFIELD'S, LTD.**—A profit of £187,223 is reported for the year ended December 31 last, to which is added £44,190 brought in, making £231,413. Interest on mortgage debenture stock absorbs £57,156, and dividend on preference shares £13,500, leaving £160,757. The directors state the results show a considerable improvement on those of the last few years, and recommend a dividend of 5 per cent. on the ordinary shares, less tax, leaving the balance of £86,366 to be carried forward. They add that with this proposed distribution the sum drawn from the balance of profit and loss account to supplement the distribution of last year will have been replaced, and the amount carried forward will be greater than it was at the beginning of 1926. The report states also that while the coal, steel and general engineering trades are still very depressed, there has been an improved demand for a number of the special products of the company, and, fortunately, the year has been entirely free from stoppages of production due to industrial unrest.

## New Chemical Trade Marks

### Applications for Registration

*This list has been specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks, and Designs.*

*Opposition to the Registration of the following Trade Marks can be lodged up to March 29, 1928.*

#### "MAPRO."

484,610. Class 4. Oils for tanning and currying, fats for manufacturing purposes, and grease used in manufacture. Marine Products, Ltd., 4, Lloyd's Avenue, London, E.C.3; manufacturers and merchants. October 4, 1927. (To be associated, Section 24.)

#### "MINT."

486,096. Class 1. Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. R. R. Mintin and Co., Ltd., 39, Cheapside, Liverpool; paint, colour and varnish manufacturers. November 22, 1927.

#### "FILMIS."

486,474. Class 4. Raw, or partly prepared, vegetable, animal, and mineral substances used in manufactures, not included in other classes. Henry Wells Oil Co., Ltd., 11, Haymarket, London, S.W.1; lubricating oil manufacturers. December 5, 1927. (To be associated, Section 24.)

*Opposition to the Registration of the following Trade Marks can be lodged up to April 7, 1928.*

#### ZEBOL

485,286. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including chemical preparations for purifying acetylene gas, and not including any goods of a like kind to any of these excluded goods. Reckitt and Sons, Ltd., Kingston Starch Works, Dansom Lane, Hull; manufacturers. October 27, 1927.

#### FERODO

485,971. Class 1. Chemical substances used in manufactures, photography, or philosophical research; and anti-corrosives. Ferodo, Ltd., Sovereign Mills, Hayfield Road, Chapel-en-le-Frith, Derbyshire; manufacturers. November 17, 1927. (To be associated. Sect. 24.) (By consent.)

#### ARTHRYTIN

486,610. Class 3. Chemical substances prepared for use in medicine and pharmacy. May and Baker, Ltd., Garden Wharf, Church Road, Battersea, London, S.W.11; manufacturers. December 8, 1927.

#### ACTICARBONE

487,520. Class 4. Activated charcoal, for absorbent or decolorizing purposes. Société de Recherches et d'Exploitations Pétrolifères (A Société Anonyme organisée under French Law), 75, Boulevard Haussmann, Paris, France; manufacturers. January 12, 1928.





## An interesting contrast

The adage that one man's food is another man's poison is exemplified by the illustrations hereon. The picture above shows the film-coating building of Kodak, Ltd.—the one thing *not* wanted was daylight. At the bottom is shown the Arrol-Johnston Works—daylight aplenty was much desired. We were responsible for the reinforced concrete work for both these factories and are well fitted, by wide and varied practical experience, to advise on the design of any type of building for any purpose.

**Build in  
reinforced  
concrete**

**THE TRUSSED CONCRETE STEEL CO. LTD.**  
*Reinforced Concrete  
Engineers*  
 22 Cranley Gardens. South Kensington. S.W.7.





S.D.  
17.42

## Commercial Intelligence

*The following are taken from printed reports, but we cannot be responsible for any errors that may occur.*

### County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

AYRE (FRANK A.) AND CO., LTD., Tregate Street, East Usk Road, Newport, oil merchants. (C.C., 24/3/28.) £40 1s. 1d. February 6.

HAMMOND (FRANCIS) AND CO., LTD., 76-86, Strand, W.C.2, manufacturing chemists. (C.C., 24/3/28.) £25 15s. 11d. January 11.

LYONS INK, LTD., 17, Park Street, Cheetham, Manchester, ink manufacturers. (C.C., 24/3/28.) £18 3s. 7d. January 30, and £15 14s. 11d. January 31.

MCCANN AND CO., LTD., 21, Cumberland Street, Liverpool, oil manufacturers. (C.C., 24/3/28.) £13 13s. 10d. February 10.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]

BRYTE, LTD., London, W.C., manufacturing chemists. (M., 24/3/28.) Registered March 10, £100 debenture, to Anderson and Stuart, Ltd., Sicilian House, Sicilian Avenue, W.C.; general charge.

WHITE (TIMOTHY) CO., LTD., Portsmouth, chemists. (M., 24/3/28.) Registered March 5, Trust Deed dated March 1, 1928, securing £400,000 debenture stock; general charge. \*Nil. November 2, 1927.

### Satisfaction

UNION OILS AND BITUMEN CO., LTD., West Bromwich. (M.S., 24/3/28.) Satisfaction registered March 7, all moneys, etc., registered July 4, 1921.

### London Gazette, &c.

#### Company Winding Up Voluntarily

AYRE (FRANK A.) AND CO., LTD., (C.W.U.V., 24/3/28.) C. G. Jolliffe, 70, High Street, Newport, Mon. Chartered Accountant, appointed as liquidator, March 9.

#### Notice of Dividend

BRIDGE, Edwin William Jones, 133-139, Finsbury Pavement, London, American and Continental drug importer. Second and final dividend 5½d. per £, payable March 27, 69, Moorgate, London, E.C.2.

### New Companies Registered

J. G. KERR AND CO., LTD., 2 and 4, Johnson Street, Liverpool. Registered March 17. Nom. capital, £1,000 in £1 shares. To acquire the business of chemical manufacturers and merchants, etc., carried on by C. Kerr, J. W. Lamb and G. W. Coates in Liverpool as "J. G. Kerr and Co." Directors: C. Kerr, J. W. Lamb, G. W. Coates.

KIRK AND CO. (TUBES), LTD. Registered March 16. Nom. capital, £5,000 in 4,500 "A" shares of £1 each and 10,000 "B" shares of 1s. each. Engineers, manufacturers of and dealers in tubes, fittings, coils, bends, and all other requirements for steam, gas, water, oil, refrigerating, chemical and distillery plants, etc. Subscribers: E. Featherstone, 11, Ironmonger Lane, London, E.C.2; H. M. Cordrey. A. K. Kirk is permanent managing director subject to holding 1,000 "B" shares.

NATURAL CHEMICALS, LTD. Registered March 20. Nom. capital, £30,000 in 25,000 8 per cent. cumulative preference shares of £1 each and 100,000 ordinary shares of 1s. each. Importers, exporters, factors, brokers and distributors of, agents for and dealers in chemicals and chemical preparations. A subscriber: S. Cronin, 31, Basinghall Street, London, E.C.2.

J. M. NEWTON VITREO-COLOID CO., LTD., 20-23, Charles Street, Hatton Garden, London, E.C. Registered March 15. Nom. capital, £20,000 in £1 shares. To acquire any inventions relating to a substitute for celluloid and glass, and in particular to acquire land from John M. Newton and Sons, Ltd., the benefit of certain existing inventions and secret processes, and to carry on the business of manufacturers of and dealers in glass, celluloid and substitutes therefor. Directors: J. Newton, P. S. Newbould, W. J. Rasey, G. F. Barrett.

RAYLUMINOUS, LTD., 12A, Princes Street, Ipswich. Registered March 19. Nom. capital, £1,000 in £1 shares. To adopt an agreement between J. Wilson of the one part, and W. G. Sames, C. B. Pigot, J. R. Reading and H. J. Garrett of the other part, for the purchase of the sole right to use, trade in, and exploit the chemical known as "Ralite," and to carry on the business of manufacturers or dealers in paints, dyes, printers' inks, glazing materials, or similar substances. Directors: C. B. Pigot, W. G. Sames.

### Oil Company's Action

#### Allegation of Food Tainting

ON Wednesday and Thursday in the King's Bench Division, Mr. Justice Swift and a special jury had before them an action by the Texas Oil Co., Ltd., against the West Surrey Central Dairy Co., Ltd., for damages for libel. The plaintiffs complained that the defendant concern had written to the Somerset County Council complaining that in an area where "Texaco" (a bitumen preparation) was used to spray the roads, milk that was collected became impregnated with the smell of naphtha from the "Texaco," with the result that food made from the milk was unfit for human food.

Defendants pleaded that the words complained of were true and published in the public interest without malice. They alleged that other traders in Somerset and Dorset had complained that butter, cream and other articles of food displayed for sale in the proximity of a road sprayed with "Texaco" became useless for food.

Mr. Edward R. Bolton, analytical chemist, of Milner Street, London, stated that he had made a test with "Texaco" in close proximity with milk and milk powders in a closed room. After several hours he was unable to detect odour or taste of "Texaco." He admitted that the smell of "Texaco" was pronounced.

Mr. G. C. Jones, analytical chemist, of Great Tower Street, London, considered it impossible for the odour of "Texaco" to penetrate into a churn of milk. If people complained about contamination of food he did not think "Texaco" could be blamed.

Mr. J. E. Hackford, F.I.C., an expert petroleum chemist, said he believed he first used naphtha and bitumen for road spraying when he was connected with a Mexican oil company in 1909. He lived over his laboratory, and his child had been fed on a form of milk food supplied by the defendant company, but he found nothing wrong with the food, although the laboratory was always full of naphtha fumes. That was due to the mercaptans it contained. Of course, by treatment, the smell could be reduced.

Mr. B. A. Shinar, sales manager of the asphalt department of plaintiff company, said because of defendant's letter sales in Somerset fell very considerably. The sales dropped from 2,959 tons in 1924 to 139 tons in 1926. He had heard of one other complaint from a Yeovil tradesman as to contamination.

Mr. E. J. Stead, borough surveyor to the Somerset County Council, said the reason he purchased less "Texaco" in 1925 and 1926 was because road sprays of a similar nature could be purchased at a cheaper price. He had no reason seriously to think that the "Texaco" smell did affect foodstuffs, but this litigation and the suggestions made that "Texaco" might injure food led his council to look with some disfavour on the material.

The hearing was adjourned.

